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The Ancestry of Automation

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I.

THE NEOLOGISM "automation" is said to have been coined a few years ago by Mr. D. S. Harder of the Ford Motor Company, in reference to a new, highly mechanized and closely articulated engine plant the firm had lately erected in Cleveland. Since then, the novelty of the expression and the portentous implications of the philosophy of industry which it epitomizes have evoked a spectacular outpouring of tracts and treatises purporting to explain automation and to predict its manifold consequences. In general, the predictions have not been very convincing. In the first place, many of them have been mere argumentation, ex parte and tendentious in style, pointing with pride or viewing with alarm.[1] Moreover, the word automation has become an omnibus word signifying all things to all men. Thus in addition to the inherently formidable difficulties facing one who would venture to forecast the ultimate social significance of automation, there has arisen a definitional difficulty, namely, What is it?

It is not the purpose of this paper to anticipate history by forecasting the social fallout from automation,[2] nor is it necessary to pronounce here its narrow definition. For while the term appears to be used in two different ways, one of them is palpably inappropriate; this is the usage which equates automation with mechanization — the substitution of machines for muscles, as in conveying semifinished work from one place or machine to another. For on this definition, automation is merely old wine in a new bottle, a new name for a process as old as man's ingenuity.

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[1] Some may find it instructive to compare the professed views of an automating employer with those of his workers. An opportunity to do so is afforded by the *Hearings* of the Subcommittee on Economic Stabilization, entitled "Automation and Technological Change," Joint Committee on the Economic Report, Sen. Paul Douglas, Chairman, 84th Congress (Washington: Government Printing Office, 1955). The testimony pertains to automation in telephony. For the employer's views see especially pp. 520-25, and for those of the union, p. 344 and pp. 640-42. By one, automation is held forth to be a blessing, and by the other a bane.

[2] It is, however, quite apparent that automation must necessarily foster further specialization of men and machines, and will thereby intensify the already rather ominous degree of mutual dependence which characterizes the population of every industrialized and urbanized nation. Truly, "no man is an island" if for nearly everything he is utterly dependent on the steady operation of a vast complex of machines he neither understands nor controls. To the extent the near future mirrors the recent past, it may be taken as a certainty that one by-product of a thoroughgoing automation of industry will be a decline in such vestiges of rugged individualism as remain in our society, coupled with a corresponding increase in government's interventions in economic activity. When all become mutually at one another's mercy, twentieth century history indicates that government is expected to balance the equities, and by common consent, to "stabilize" the market place. But even as now we will, without intentional irony, speak of free enterprise.

The other and better usage contemplates new systems of *control* as "automation" rather than new energy sources and more prime movers. It is, therefore, akin not to mechanization but to Norbert Wiener's *Cybernetics*[3] (etymologically, "steering"), and it pertains to automatic discrimination and sensing rather than to muscle-saving and the mitigation of backbreaking working conditions.

II.

Automation, rightly understood as signifying nonhuman control, represents the confluence of two streams of thought. For present purposes, each of these may be declared to have originated (while conceding that intellectually every generation stands on the shoulders of its predecessors) during the nineteenth century. One stream was essentially in the domain of natural science, and its end result was the technical apparatus which is now making automation physically possible. The other was basically economic and sociological in scope, and it provided a rationale for automation as distinguished from a methodology and an instrumentation. Where the first consisted in researches into the nature and uses of inanimate things, the other meditated upon the history and the future outlook for man's relationship with other men, with special reference to people as both means and ends in the scheme of economic activity.

Automation means control, and control is pointless without a basis for discrimination. He who is indifferent between one outcome and another has no need for controls. But if a distinction is made between a "good" and a "bad" eventuality, a means of bringing about the one and fending off the other becomes a distinct asset. The dawn of the industrial revolution had to await the harnessing of power, and its fullest fruition can never be realized until man's mastery over power — that is, his control over it — as well as his knowledge of its sources and potentialities has become absolute. Abstract power can kill as well as create, and domesticated power, having no volition of its own, magnifies impartially men's abilities to build or botch. Thus with the advent of the industrial revolution and the consequent acceleration of the tempo of factory processes, it became imperative to devise controls and safeguards more discriminating and more reliable than the imperfect human sensory system. The industrial revolution did not hinge on the development of new tools, strictly speaking; what it wrought was a profound change in the way of propelling old tools, based on the transmission of power to the tool through new machines, in a quantity and at a pace which made new methods of control mandatory.

The new controls which were developed in response to this obvious need were, at first, themselves mechanical, for the industrial revolution of course antedated men's knowledge of electronic principles. The prototype of them all, the ideal perhaps, happened also to be nearly the first as well; and it utilized the great principle of "feedback" which is truly the heart of modern automation, whether electronic or mechanical. This was James

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[3] Cambridge, Mass.: Technology Press, 1948.

Watt's centrifugal governor for the steam engine. By virtue of its governor, when a steam engine's pressure reached some predetermined critical figure, the engine itself opened its own safety-valve, and at some lower limit the valve would again close. This admirably simple device, however, did not "automate" an engine, since it afforded no means of controlling, for example, the rate at which fuel was fed into the engine. Nor did the governor provide for any communication from the machine to be driven to the engine which drove it; if something went wrong a loom could thrash itself to pieces and hash the work into a tangled snarl of thread without halting the inexorable drive of its engine. An engine drives a toothless gear or a blunted tool as willingly as it does a perfect one. In the last analysis, therefore, human intervention always proved annoyingly indispensable.

Consequently a good deal of the best thought of the nineteenth century went into the solution of control problems by mechanical means — tie-rods, clockwork-and-cam systems, and so on. As early as 1801 Jacquard had proved the practicability of his automatic loom, and a few years later Charles Babbage exhibited a rudimentary mechanical computer. A generation thereafter the feedback principle, utilizing steam, was revolutionizing the navigation of vessels, whose tendency to meander had ncreased more or less proportionately with the increased size and inertia of their rudders, because of the "hunting" or over-correction problem. But no such instances of pre-automative control truly constituted what are called "closed systems." For in each, an irreducible minimum of one man, complete with his shortcomings as well as his skills, was a necessary part of the linkage.

During the same period, however, various closet-theorists and mathematicians were unearthing the stones which, in time, were to serve as the foundations for genuine automation. In 1854, Boole published his *Laws of Thought,* the pathbreaking treatise which foreshadowed the binary systems underlying today's computers. And in 1865 Clerk Maxwell, Cambridge mathematician, committed to paper (by the light of a whale-oil lamp, it is said) a complex system of equations. At the time of its publication this mathematical confection caused no great ripple. But as happens now and again with purely theoretical "proofs" of relationships, this one initiated a chain of factual researches which still continues and which is, more than most of us realize, revolutionizing our material world and thereby our cultural and political life. For through the investigations of Hallwachs and Hertz, Fleming and his "valve," DeForest and a host of others, Maxwell's equations sired the incalculable developments in thermionic emission and photoelectric techniques which to automation and the new communication systems have become what steam was to the industrial revolution.

III.

Where there prevails an unfriendly climate — extremes of heat or cold — which interdicts or hampers human supervision, automatic controls often can function. Where powers of discrimination and superhuman sensitiveness to minute differences are indispensable to a process, non-automated operation would be impossible. (The trend toward miniaturization of components which characterizes the communications industry is a case in point.) And in general, wherever time is of the essence and where unflagging attentiveness and an instantaneous reflexive response to a subtle stimulus are imperative in a productive process, automatic controls invariably out-perform human beings. In a sense, Nature herself takes cognizance of this. Just as "war is too serious a matter to be left to the generals," the preservation of life is too vital to be confided to human volition; each of us is equipped with a marvelous system of thermostats, gyroscopes, and valves charged with maintaining an appropriate homeostasis. These internal "feedback" controls operate independently of the will; rarely need we attend to our own equilibrium, uprightness, or metabolism. In fact we survive sometimes, as it were, in spite of ourselves.

As machinery transcends musculature in matters of simple force, so non-human controls excel in attentiveness as well as in accuracy and consistency. All this was early known, and almost concurrently with the advent of the machine there began a quest for automatic controls. For the essence of the machine technique — so far as it is justified by the market place — is endless iteration of a simplified process. And although the machine was willing to accept, functionally speaking, such a station in life, it soon became all too apparent that its operative was not.

Strictly, a "revolution" signifies total and rapid change; a "gradual revolution" is a contradiction in terms.[4] And the industrial revolution approximated a true revolution, for its shock-effect was tremendous. It uprooted men; it enriched some and impoverished thousands almost overnight; the totality of uncertainty it generated was colossal. There is no way of computing the algebraic sum of the welfare and illfare which were its by-products, but the animus which quickly appeared (and still exists) against the machine as the outward and visible sign of the industrial revolution evidences that rightly or wrongly, most people feared and resented the new dispensation. "Luddism" was more general and more enduring than is suggested by most histories: it merely went underground.

Thus while in absolute terms machines, where introduced in force, were very often immensely productive, it was common knowledge among masters that their potential or "capacity" was in practice seldom realized. For this there were two reasons. First, the machine's operative — not unreasonably, in the light of the times — regarded it more as a rival than as an auxiliary. Like most masters, he too had an abiding faith in the "lump of work" doctrine, from which it followed by logic that the operative's job-tenure bore an inverse relationship to the productivity of the machine. Secondly even if operatives worked with a good will, individual differences in pro cedures, coupled with the boring monotony of repetition, introduced annoying variations and mistakes into the productive process.

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[4] *USA: The Permanent Revolution* (New York, 1951), by the editors of *Fortune,* is both accurate and intensely interesting; but its subject matter has to do with evolution not "revolution."

All foremen and most employers knew well that job-stretching was a salient element in the folkways of the shop, and that a distant indifference to the employer's interests was typical of his workers. In the nonunion world of the nineteenth century, masters determined wages, but workers controlled the quantity, and to some extent, the quality of output. Consequently, each group tended strongly to use its powers for its own ends. Among masters, low wages were commonly regarded as indicative of prudent management;[5] and among workers, "rate-busting" meant ostracism and sometimes worse. In the nineteenth century workers were not disposed to regard Stakhanovites as national heroes.

IV.

In 1856, a century ago this year, there was born in Philadelphia a rather extraordinary man named Frederick Winslow Taylor. Very early in life Taylor displayed a marked inventive and mechanical bent. Despite his comfortable middle-class background, on reaching young manhood Taylor chose a blue-collar career. Through successive apprenticeships he became competent both as machinist and patternmaker, and in 1878 he went to work in the Midvale Steel Company. The period was characterized by a prolonged decline in prices generally, and like many another firm Midvale was unprofitable. Thanks to his intelligence and great drive, and perhaps to helpful connections, Taylor had received several promotions and by 1885 was assistant to the works manager. In that year Taylor persuaded top management to give him a free hand in making operational certain ideas he had conceived in respect to possible cost reductions; and thus was born the system of production which within a few years received world-wide *réclame* under the style "scientific management."

Taylor was, among other things, a good empirical accountant in a period when formal training in this *mystique* was nearly nonexistent. In addition he had a first-rate analytical mind and a wide practical knowledge of shop procedure, as well as a recent recollection of the folkways of shop operatives in respect to output restriction. Taylor was therefore convinced that the first step in reducing costs was to increase costs. This seeming paradox perhaps deserves explanation.

Machinery and equipment, especially in heavy industry, were even in Taylor's formative period becoming very expensive. Consequently the phenomenon of overhead costs had become important. To Taylor (though, surprisingly, not to most tycoons of the times) it was self-evident that where large overhead costs were present, costs which were independent of output, a prime consideration must be to devise a means of "spreading" these as widely as possible — in other words, to find economies in *average* costs. Optimum utilization of expensive equipment would of course reduce sharply the overhead costs assignable to each item produced. But maximum utilization of machinery was impossible without the willing cooperation of its operative. And the operative knew (or thought he knew) from impressive experience that to maintain some semblance of job tenure for himself, his own interests lay in inhibiting the machine from operating at maximum efficiency. For in those days, pretty much as now, labor was regarded as a variable cost; the recurring "crises" filled many with fear, and the gentlest wind of adversity was likely to blow away many a job. Initially, therefore, Taylor's missionary efforts had to be directed toward employers. These had to be persuaded that, within limits, payment of higher wages — actually, piece rates on a differential basis — would bring more than proportional economies in machine costs per item produced, resulting in an over-all cost reduction per unit despite a probable increase in *total* costs of operation. Moreover, the new ways of the employer had to be justified to his workers, who too often had witnessed, once labor unleashed its full productive capacity, a sudden reduction in the new, higher, and supposedly permanent rates which had induced the unleashing.

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[5] There were occasional exceptions; for example, Robert Owen or the Parisian house painter Leclaire, both of whom preached and profited mightily from the gospel of high wages.

By the turn of the century "Taylorism" had become an international vogue. The new gospel was being received respectfully in every industrialized country, and Gantt, Halsey, Barth, and others besides Taylor were busily initiating "scientific management" schemes wherever it seemed feasible to reduce production to a sequence of repetitive operations.

Wherever Taylorism was introduced, higher wage rates went into effect as a necessary precondition. But the increase in wages was seldom proportional to the great increase in output which was the price workers paid for it. Moreover, a high degree of procedural conformity was demanded of workers. Declared Taylor, "In almost all of the mechanic arts, . . . the workman who is best suited to actually doing the work is incapable of fully understanding it";[6] and it was thus imperative to "develop a science for each element of a man's work, which replaces the old rule-of-thumb method."[7] In practice, this meant deskilling the worker, and with the aid of innumerable time-and-motion studies, promulgating a rigid code of procedure which, superseding the worker's judgment, would thenceforth govern his workaday life. His stance, his choice of instruments, the sequence of his movements, and even the arc allowable to his arms was to be predetermined — ignoring entirely the *Gestalt* of the situation, and of course, the effect on morale. In short, pristine scientific management contemplated reducing the worker to a robot by depersonalizing and quasi-mechanizing him. Thus could individual differences be abated, together with the conflict of interests between man and machine. To all intents and purposes man and machine would become one self-correcting entity, and operationally a closed or "reset" system would be approximated. Although physically the operative remained a link in the system, qua person he would be neither necessary nor tolerated, and the "human element" with its attendant frailties and contradictions would be eradicated.

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[6] F. W. Taylor, *Principles of Scientific Management* (New York: Harper and Brothers, 1911), p. 25.

[7] *Ibid.*, p. 36.

V.

Thus Taylor's scientific management constituted a true precursor of automation. For automation, which holds forth the hope of eliminating men corporeally as well as volitionally from the routine productive and transformative processes,[8] is merely a refinement of Taylorism which carries scientific management to its logical conclusion. For several reasons, scientific management fell short of fulfilling its early promise. For one thing, the astounding growth of the service and "paper" trades,[9] where routinism has until lately been impracticable, has opened alternatives which have tended to shelter workers from the full force of Taylorization. The growth of unionism has in similar fashion served to prevent its grosser applications. And there have been other reasons — notably, perhaps, the tendency of people, once a breakthrough from a mere subsistence level is achieved, to demand greater diversity rather than merely more of the same.

There is therefore abundant reason for believing that people and automation can coexist. "Things are in the saddle and are riding men," said Emerson a hundred years ago; but those who fear the new golem of automation may perhaps take comfort in the realization that people as ends, as consumers, will always make the final disposition of people as means. And in response to whatever new problems automation poses, we may assume with reason that people themselves will evolve a solution, just as in the nineteenth century the exigent scarcities of the time and place evoked the trains of speculative thought which laid the foundations of automation.

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[8] Here the key word is *routine;* it is undeniable that a corollary of automation is the "upgrading" of many workers to positions which offer some scope for discretion and the exercise of judgment. Of necessity, automation will, it seems, greatly diminish the number of "underemployed" persons. But the essence of Taylorism was that it tended to increase it.

[9] In the thirty years preceding 1950, the number of office workers increased by 150 percent whereas factory workers increased only 53 percent. Cf. John Diebold, *Automation* (New York: Van Nostrand, 1952), p. 91.

An Economic Advisory Council at the State Level

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SOME recent oscillations in the business cycle and the prominence of the President's Council of Economic Advisers has served to reawaken some interest in economic planning by state governments. An unusual manifestation of this mild renaissance is the Governor's Economic Advisory Council in Michigan. Quarterly, and more frequently in periods of economic decline, a group of ten or twelve advisers meets with the governor to examine graphs and statistics and to review changes in various indexes and the gross national product. The Council is a standing interdepartmental committee designed to keep its finger on Michigan's economic pulse, somewhat as the President's Council of Economic Advisers watches the national scene.

The Michigan Council consists of representatives of those agencies which are most concerned with economic trends and/or which routinely accumulate statistics which are significant economic indicators. Although the membership has fluctuated, representatives of the state departments of revenue, social welfare, economic development, agriculture, employment security, labor, administration (budget), and the economics departments of the University of Michigan and Michigan State University are regularly in attendance. Some of the representatives are department heads; others are second echelon research and planning specialists. The academicians are business forecasters and include an agricultural economist.

Origin of the Council

Unlike most government activities, the Council is not based on any statutory mandate. It was initiated by Governor Williams and is one of the many extracurricular activities of the Executive Office. Its conception is attributable to the governor's concern for the maintenance of full employment, to the sensitivity of Michigan to national economic oscillations, and to the resultant impact on state agency programs.

Although Michigan is a comparatively wealthy state with high wage levels, its heavy industry is vulnerable to even small dips in the national economy. As a rule, when the national economy is on the upswing, peak employment and income prevail in Michigan and workers stream in from other regions; but when national income declines, Michigan is seriously affected. Thus in the business recessions of 1949 and 1954 Michigan had substantial unemployment, and in 1951, when the rest of the nation was experiencing the Korean war boom, Michigan had a period of conversion unemployment. Two related factors have been the doldrums prevailing in the upper peninsula and in agriculture. The decline in agricultural income has been acute in Michigan because of the prominence of dairying. Traditionally the upper peninsula has been a low-income area with chronic unemployment (12 percent in January, 1955) since the demise of lumbering and copper mining.

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The name, character, and functions of the Council have varied somewhat since its inception in 1949. The business recession of that year prompted Governor Williams to organize a Michigan Full Employment Committee, comprising representatives of the state agencies enumerated earlier, the secretary of the Michigan Municipal League, and — occasionally — some local officials and business leaders. To cope with the widespread and acute industrial unemployment, the Full Employment Committee operated as an instrument for stimulating and coordinating the activities of state agencies, the affected communities, and Federal agencies. The principal programs of the FEC were promotion of numerous local full employment committees to enable each community to tackle its own problems, stimulation of state capital construction programs, dissemination of information to businessmen regarding Federal loans and procurement, stimulation of private and public housing by publicizing provisions of the Federal housing laws, assistance to local communities in attracting or holding industries, and numerous labor market surveys in order to enable communities to qualify as "labor surplus" areas entitled to preference in Federal contract awards. A subcommittee on statistics and research compiled and interpreted economic data in the manner of the present Council. The FEC relapsed into dormancy as business turned upward in 1950.

In 1951, Michigan experienced another wave of unemployment as a consequence of limited supplies of scarce metals during the Korean emergency. The Full Employment Committee was not revived, however; instead Governor Williams established a Governor's Emergency Defense Contracts Commission, following the visit in January, 1952, of a task force from the Defense Production Administration. The Commission consisted of several prominent industrialists and representatives of the state departments of employment security and economic development. It operated as an adjunct to the latter agency and concentrated on securing defense contracts for Michigan manufacturers. A small outpost was established in Washington under the joint auspices of the Commission and a public utility company. The Commission's activity tapered off in 1953, but it has been continued under the title of the Governor's Emergency Production Commission.

When defense spending began to diminish in 1953, the Full Employment Committee was reactivated in order to foresee and prepare for impending developments. As anticipated, the military production cutbacks seriously reduced Michigan's heavy industry output and during 1954 the state's unemployment was distinctly higher than the national level. Fortunately the recovery in December, 1954, was as rapid as the recession the year before. The reactivated committee has been less a fire department action agency than in 1949; rather it has focused on trend analysis and broad-gauge planning — as reflected in the change of name.

Functions and Objectives

The original and over-all objective of the Council is the planning of state government policies for the promotion or maintenance of high employment and income. In this respect its paramount objective is the same as its national prototype, the President's Council of Economic Advisers. Manifestly it cannot pursue this objective by the intended method of the President's Council, that of controlling the business cycle, since that is far beyond the reach of a state government. Indeed some would say that the maintenance of high employment is entirely beyond the power of a state. There are, however, two broad approaches by which a state government may, with limited success, pursue this goal: (1) by long-term policies and programs to bolster particular segments of the state's economy, and (2) by short-range programs to furnish alternative employment in periods of recession.

The meetings of the Michigan Advisory Council regularly involve a review of economic trends during the previous quarter, accompanied by consideration of the immediate and intermediate future. The statistics which the Council analyzes include both Michigan and national business statistics. The latter are principally the general business indicators published by the United States Department of Commerce in its monthly *Survey of Current Business* and weekly supplements: national income, gross national product, personal income by source, farm income, price indexes, industrial production indexes, personal savings, and consumer expenditures. These are given close attention because Michigan's preponderantly export economy is so dependent upon national consumption rates for automobiles and other manufactures.

The principal Michigan business indicators include monthly sales tax receipts, social welfare caseloads, bank debits in the larger cities, electric power consumption, detailed weekly employment and wage data for various industries and the thirteen industrial areas of the state, and monthly agricultural statistics. The latter include crop reports and forecasts from the Federal crop reporting service and Michigan State University's indexes of prices received and paid by the state's farmers, the farm price parity index, farm product and feed prices, and farm labor income.

The statistics are supplemented by prognostications gleaned from various business and government sources. Three outlook items are particularly significant. Regularly the Employment Security Commission prepares detailed employment forecasts for the automobile industry based on manufacturers' confidential predictions and on the Commission's extensive knowledge of that industry. Periodic surveys by the Michigan State University's department of agricultural economics of the state agricultural situation predict income in the major segments of agriculture. Less frequent, but valuable, is the survey of consumer finances which is conducted annually by the University of Michigan for the Federal Reserve Board.

The Council, and more particularly some of its member agencies, have been concerned with such long-term matters as an upper peninsula development program, the industrial promotion function of the department of economic development, mineral ore research, and an extensive agricultural marketing analysis and research program.

The principal short-term employment maintenance action has been the effort to secure "Michigan's share" of Federal production contracts generally, and particularly for industrial centers with substantial unemployment. Whenever unemployment in any Michigan city reaches 6 percent, the Federal definition of "critical," Washington is bombarded with telegrams.

Public works — the full employment nostrum so frequently proposed by economists and laymen alike — have received only sporadic attention. At one time a list of potential projects was assembled but little use was made of it. Several factors explain the limited emphasis on public works planning: the geographically spotty and generally short-run character of postwar unemployment, the difficulty of quickly converting an auto worker into a construction worker at some distant location, the fact that the state of Michigan has had an extensive construction program since World War II, and the fact that the maintenance of a long-range capital needs budget is a statutory duty of the department of administration.

In view of the limited ability of a state government to avert unemployment, the Council perhaps is more useful in the pursuance of two subsidiary objectives: the amelioration of unemployment problems and the adjustment of agency programs to the impact of economic changes. In our system, state governments have the major responsibility for the amelioration of unemployment effects through the twofold employment security program—vocational training and rehabilitation and social welfare. The Council's deliberations have been particularly relevant to recent amendments of the employment security statute and changes in the maximum categorical assistance payments.

The Council is a mutual economic intelligence agency for the participating agencies. The recognition of economic trends patently is of vital concern to the departments of revenue, employment security, social welfare, economic development, and administration. The member agencies appreciate this institutionalized medium of intelligence exchange. Possibly the fruit of this consultation would be beneficial to other agencies and private organizations. There has been discussion of devising some sort of composite state economic indicator and a newsletter presenting selected statistical series accumulated by state agencies, but no definite action has been taken thus far.

Evaluation

When governmental planning was the fashion in the 1930's, the national planning agency — the National Resources Planning Board — promoted the genesis of corresponding state planning boards in most of our 48 commonwealths. Following the untimely demise of the NRPB, planning lost popular interest and status and the state planning commissions withered away from fiscal malnutrition. Some were superseded by departments or commissions of economic development — narrow-gauged agencies concerned primarily with luring industries from sister states.

The President's Council of Economic Advisers has not promoted corresponding state agencies. Its relations with state agencies have been slight or negligible, although some state budget agencies have made good use of its regular publications. Assuming that state governments could profitably engage in more sustained economic planning (now principally an incidental to biennial budgets) and should utilize more fully the data and findings of the President's Council, many state governments today lack adequate mechanisms for planning.

Clearly the Michigan Economic Advisory Council is still in an evolutionary stage and its permanence will not be assured before a change of administration. Lacking any statutory basis, it may vanish as quietly as the Arabs if successors do not share Governor Williams' interest. Conversely, its functions may sometime acquire statutory recognition and/or be vested in a particular agency.

The informal basis has afforded flexibility but has also been responsible for some discontinuity and confusion in purpose. Its activity has fluctuated considerably, depending upon economic conditions and the Governor's preoccupation with political business. It has the inherent weakness of committees, including the characteristics of much talk but little decision or action. However, the Council is not an operating unit and the results of its deliberations must be reflected in the operations of its member agencies and in the Governor's legislative policies.

The Council may be significant as an example of an interagency committee approach to the goals of high employment, the perception of economic trends, and appropriate adjustments of state policies. In Michigan this approach is more a matter of necessity than choice because of the fragmented administrative structure. Since Michigan is not the only state with splintered government, this approach may be appropriate elsewhere. It might even be useful in states which have undergone administrative reorganization, because no amount of "streamlining" will ever concentrate all economic functions and intelligence in one agency.

Value Judgments and the Public Opinion Polls

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PUBLIC OPINION POLLS seem to be occupying an increasingly important position in American life. No longer restricted to predicting the outcome of elections, they are now operated continuously, seeking to ascertain the state of public opinion on subjects ranging from our foreign policy to workers' satisfaction with their employer. Not only are these polls taken, but their results often serve as the basis for action. Thus, one of the leading bosses in New York State is supposed to have swung his support to Harriman in the last gubernatorial race largely on the basis of a public opinion poll.

To judge from what one reads in newspapers, these polls are becoming increasingly scientific, a belief that has been greatly abetted by liberal use of the term "probability sampling." Sampling technicians are not unaware of the many pitfalls and value judgments underlying public opinion polls, but there does not seem to be very much general awareness of the full extent to which such polls are an art rather than a science. Especially with the extra fanfare accorded these polls in an election year, a review of the principal ways in which value judgments enter into these polls would seem useful. It might be noted that the term "value judgment" in this article will refer to the application of subjective considerations to a problem rather than to the purely ethical question of distinguishing "right" from "wrong."

Instead of considering on an individual basis the various ways in which judgments enter into public opinion polls, we shall examine systematically the means by which value judgments enter into each of the various stages of a polling operation. First we shall consider value judgments peculiar to polling alone, and then judgments common both to polls and to other sampling operations.

Judgments Peculiar to Polls

Any polling operation goes through the following main stages, more or less chronologically.

1. Specifying the problem — what do we want to find out?
2. Selecting a population — from whom is the information wanted?
3. Deciding on the medium for obtaining the information — mail, telephone, or personal interview, usually.
4. Determining the sample design, size, and means of selection — which members of the population shall be picked and by what means?
5. Constructing a foolproof questionnaire, naturally.
6. Hiring, training, and supervising interviewers, if the information is obtained by telephone or personal interview.

7. Conducting the survey and getting the data while repulsing canine attentions.
8. Coding, editing, and tabulating the data.
9. Analyzing the results.
10. Interpreting the results.

The first and the last two stages are common to all statistical studies and are therefore discussed in a later section. The others are taken up in the following paragraphs.

Selecting a Population

Wherever there is some question regarding the inclusion of certain segments of a population, and there often is, judgment plays a role at the very start of a survey operation, in deciding who is to be sampled. Thus, in ascertaining the attitudes of the residents of Lower Slobbovia toward cleanliness, should the survey be restricted to those residing within the city limits or should the surrounding areas also be included? What is the lower age limit at which people should be excluded, 18 or 21 or something else? On many issues — universal military conscription, to name an outstanding example — opinions of teen-agers differ substantially from those of older people.

Often a question arises concerning the area to be sampled. Most surveys do not cover the entire nation but are made in one or two selected cities. The state of opinion can vary markedly by city not only on such obvious questions as segregation, political affiliations, and labor unions but often even on such supposedly mundane issues as shopping preferences and grade school teaching practices. With the cities to be surveyed often picked more or less arbitrarily, the results of the poll can often unknowingly be predetermined before the survey has even begun.

Obtaining the Information

Determining the medium through which to obtain information — usually mail, personal interview, or telephone — is at times a routine task dictated by the manner in which the problem is set up, and is at other times a matter to be settled by the survey executive. Whatever the situation, the method used for obtaining the data can influence substantially the final results.

Telephone surveys invariably produce relatively brief answers to questions, so that fewer reasons for particular attitudes are obtained and often pertinent ones are omitted. Nonresponse on mail surveys runs at times as high as 90 percent, and whether the attitudes of the 10 percent responding reflects equitably those of the other 90 percent is a moot point. Bias in mail surveys results also from a tendency for people other than the respondent to answer the questionnaire (secretaries for businessmen, grade school children for parents), for those with strong opinions on an issue to respond, and from the difficulty of controlling geographic distribution of the returns — often closely related to the issue under study.

Personal interviews, on the other hand, are accompanied by another set of dangers. A decision to interview in the daytime — very often the case for public opinion surveys — can mean underrepresentation of men and working wives if interviews are conducted in the home, and overrepresentation of the same group if interviews are conducted on business streets. Certain types of questions are not easily asked on personal interviews, at least not of all people, as, for example, means of birth control. A separate and major source of bias, where judgment often plays a helpful role, lies in the training of interviewers and in the interviewer-respondent relationship, which is discussed in a later section.

Fortunately, a considerable body of literature which can assist one to an informed decision on such matters is available to pollsters on the various ways in which these media influence survey results. Whether much use is made of this literature, however, is an open question.

Sample Design, Size, and Selection

Two basic methods of sample member selection are used in polls (as in other surveys) these days. In one, *judgment sampling,* the sample size and number of people to be obtained from each group (age level, area, and so on) is fixed by the central office but the choice of *individuals* is left to the interviewer. He may be told something like: "Interview 12 people, half of each sex; 4 between 18 and 34 years of age, 5 between 35 and 64, and 3 who are 65 or over; also 3 should be from the lower-income groups, 6 from the middle-income groups, and 3 from the high-income levels." He is then free to find them where he will (though sometimes he may be restricted to one particular area). Being only human, the interviewer immediately sets out to minimize the amount of work by (a) picking those most easily accessible — relatives and neighbors often fit the bill nicely, (b) not walking to up- or downstairs apartments if he can avoid it, (c) picking "nice" neighborhoods, (d) fudging a little if he ends up needing someone not easily found, such as a female, between 18 and 34, retired and in a high-income group. Considering such cases, what is surprising is not that so many of the polls turn up with questionable results but that so many of them do produce creditable findings.

The other means of sample selection, *probability sampling,* removes many of these dangers by taking the selection of the individuals to be interviewed out of the hands of the interviewers and using a mechanical process whereby each member of the population has an equal chance of being picked for the sample. This removes the element of judgment in the selection process *provided* that complete lists or tabulations of the population are available. If they are not available, a procedure known as *prelisting* is often used whereby interviewers or clerical staff are sent into the field and told to list all dwelling units (or individuals) within specified areas. This task is much more difficult than it sounds, for overlooking of apartments in former one-family homes and of off-street dwellings is a frequent occurrence. If sufficient care is not taken, this method becomes essentially what might be called "probability sampling from a judgment population." The resulting bias can at times exceed that which would be obtained by straight-forward judgment sampling.

Considerable judgment enters into

the specification of sample size and into the determination of sample design (area sampling, cluster sampling, and so forth). However, in contrast to the previous cases, the effect on the results of the poll is not likely to be noticeable in any case; most estimates at this stage can be based in part or in whole on mathematical formulas, with predetermined limits of error.

Constructing the Questionnaire

The subjectivity in all of the foregoing stages of a sampling operation pales into insignificance when we come to the problem of question wording and questionnaire design. Three separate problems arise at this stage, in every one of which value judgments are of such a high order of importance that a decision one way or the other can alter completely the nature of the results obtained. One is the general approach to the individual. Shall the information be sought by direct questioning, by roundabout probing techniques, by psychological "projective" techniques, or what? Particularly if projective techniques are used and if an attempt is made, say, to ascertain what factors in one's love life influence one's attitude toward his employer, the field is wide open. In a study on prunes some time ago, two so-called motivation researchers using identical techniques came up with diametrically opposite results — one that the laxative effect of prunes should be stressed, the other that people's sensibilities are affected negatively by this factor. Members of this species have even been known to come up with different results in analyzing the *same* set of data, a skill which psychologists have already developed to a high state of perfection. . . . Even where projective techniques are not employed, different general approaches may influence substantially the nature of the results.

The second problem, namely the matter of question wording, is an equally difficult one. People being what they are, and the English language being what it is, the problem of communication is in many respects insuperable. Individual words have meanings that differ not only by the dictionary but according to the manner in which they are combined with other words and according to the person to whom the question is addressed (let alone possible inflections in the manner of asking the question). It is well known that questions phrased one way yield entirely different answers than the same questions phrased in another manner. Asking "Do you favor having meetings begin at 8 A.M.?" would elicit different frequency of response than using the more "sensible" wording, "Do you favor morning meetings beginning at the ungodly hour of 8 A.M.?"

An associated pitfall, which many public opinion polls appear to be highly proficient at falling into, is that of obtaining opinions on issues from people who have no opinion. This is caused in part by leaving no opportunity in the question for people to say they have no opinion, in part by a desire of the interviewer to come up with a definite answer, and in part by a reluctance of respondents to admit not having an opinion. These are well-known problems, however, and can be largely corrected by proper question wording and interviewer training.

More serious is the failure of the polls to relate knowledge of an issue to opinion expressed. Many people have definite opinions but either no knowledge or incorrect knowledge about an issue, and these opinions often differ substantially from those of the informed. Thus, in an experimental survey of the author's conducted in 1955, pros and cons on resale price maintenance were split about 50-50. Among the informed, however, 85 percent were against it! There is no doubt that many of the results reported by the polls reflect ignorance and misinformation more than they reflect informed opinion.

Questionnaire organization is the third highly subjective problem in this area. It is well known that response to particular questions can vary with their position in a questionnaire, and with their position vis-à-vis related questions. Relatively little has been done, however, to measure such effects and even less seems to be done in most surveys with regard to mitigating such influences.

Interviewers

An unfortunate attribute of our "primitive" society is that personal interviews are still conducted by people. This brings into focus the problem of the care and training of interviewers, one of the most vexing faced by survey organizations. It is a problem which only begins with the hiring and training of interviewers, for each interviewer has to be taught to act pleasant under all circumstances, not to show any personal feelings, to ask questions in a particular manner, to transcribe only what he hears, to secure answers to all questions, to shake the jelly-covered hand of any child that proffers it — in other words, to act as if he were not what he is, human. Rarely is this the case, of course, and particularly so since practice, as usual, differs substantially from theory. Especially in times of high employment, interviewers are hired with not too much attention to qualifications. Usually they work on a part-time basis, as an "extra" to a regular job elsewhere, and neither they nor the polling organization have much time to spend on such niceties as training, practice interviews, avoidance of bias, and so on. As a result, the interviewing stage in a poll is one of its weakest points. Democratic interviewers turn in Democratic-slanted results; Republican interviewers are biased in the other direction; pro-segregation interviewers produce similarly oriented interviews; and so it goes.

Supervision of interviewers in the field is generally not what may be desired, which is true even when this work is subcontracted to special interviewing organizations. Often such supervision is nonexistent. Under these conditions and especially where interviewers are free to pick whomever they want, it is not surprising that many of them carry the process to its logical conclusion, and turn in perfectly completed interviews without having interviewed anybody! The extent of this practice is unknown — for obvious reasons — but in polls based on judgment sampling it may well be substantial.

Getting the Information

Interviewer discretion is the main source of judgment, and bias, at this information-gathering stage, as has been discussed earlier. In addition, however, there is the matter of substitution in probability samples. This is a rule often promulgated by the central office to the effect that if someone in the designated dwelling unit is not home, the interviewer can pick a person in the next unit to the right (or left). Applied extensively, the result can be a highly unrepresentative sample if the attitudes on the issue of those not at home frequently differ from those who are.

Then, too, there is the matter of which individual in a household is to be interviewed. Often this is left to the interviewer even in a so-called probability sample, with the result that the sample is biased with respect to such characteristics as age and sex.

Coding, Editing, and Tabulating

A fair degree of judgment enters into the editing and coding of answers to open-end questions — those questions where the respondent is requested to express an opinion at some length. The problem of combining such answers into a few simple categories is not an easy one and can at times produce answers that were never given. Thus, answers such as "don't like to pay for insurance" or "dislike insurance agents" may be combined into one category "against health insurance." Pitfalls due to compressing open-end answers are well known, however, and generally can be controlled.

Judgments Common to All Statistical Operations

Having covered some of the principal ways in which judgment enters into the distinctive stages of a polling operation, we may now review briefly the role of judgment common to all statistical studies, namely, specifying the problem, analyzing the results, and making interpretations.

Specifying and formulating a problem — including recognizing the existence of a problem when it is staring one in the face — is a highly skilled art, one that involves in many ways more judgment than any other stage of a study. Determining the purpose of the study, what information is to be obtained, and — as is often overlooked — what bearing this information may have on the problem at hand involves a series of judgments any one of which can predetermine the results before the survey has even begun. Thus, a survey of people's savings habits can yield completely different results depending on whether purchases of durable goods (inclusive or exclusive of depreciation allowances) are included as part of savings or not — and both approaches are, of course, correct.

The analysis and interpretation of survey data is subject to all the foibles and weaknesses of the researcher. Although there are certain guideposts in interpreting data — such as the admonition to present evidence on both sides of the question, to note the limitations of the data at least in fine print, and so forth — the matter is essentially one of judgment, in which biases play a major, if not determining, role. President Eisenhower can be represented to be "highly popular" if a majority of those polled approve of his actions, or at the same time his popularity may be represented as "waning" if the proportion approving of his policies is lower than on the previous poll.

An aspect of analysis where the role of judgment is not so well recognized is in the application of sampling error formulas in the analysis of the data. The general practice is to apply such formulas to draw inferences and test hypotheses whenever the sample members have been selected on a probability basis (and sometimes even when they have not). But this is nothing more than worshipping a stone image. In practice there is no such thing as a probability sample. Errors of omission and commission combined with the problem of nonresponse (which can be mental as well as physical!) are such that what we end up with are different degrees of judgment samples. In a realistic sense, therefore, the problem we are faced with is: How much judgment can there be in a judgment sample without invalidating sampling error formulas in a practical sense? The answer to this question depends clearly not only on the degree of judgment present in the particular sample (if it can be measured at all) but also on the conditions and requirements of the problem. A small degree of judgment may well invalidate the applicability of sampling error formulas in certain cases whereas in others a larger degree of judgment would not. Needless to say, the role of value judgments here is a tremendous one, and much of it is unsuspected.

Summary

If there is one thing this review has affirmed, it is the central role played by value judgments in polls and other sampling studies. Despite all the emphasis on rigor and precision, polling in practice is essentially a highly subjective field where judgment is the determining factor at most of the key stages. The great differences in the quality of polls and surveys in practice and the difficulties encountered in setting up meaningful and enforceable standards for the practical execution of surveys are all manifestations of this fact. In theory, sampling can be precise and rigorous; in practice, sampling represents a compromise between the dictates of theory and the realities of the situation.

At the same time, sampling is a field in which the value judgments that are made can generally be well-informed ones. A considerable body of literature is available which makes possible in the great majority of cases the selection of reasonably "rational" and relatively unbiased procedures. The great weaknesses in polling at the current time are sample member selection, question wording, and questionnaire construction, problems by no means peculiar to sampling. Hence, we end up with the conclusion that although the degree of precision with which polls can be conducted may have increased, value judgments still permeate the entire field. On many aspects of polling, a sufficient body of knowledge is available concerning the effect of different kinds of value judgments on survey results to enable well-informed decisions to be made. Nevertheless, the personal judgment of the researcher continues, and undoubtedly will continue, to play a paramount role.

Rural Road Costs and Size of Road Unit

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PARTICIPATION in highway improvement by a unit of government higher than the county or other local unit has proceeded gradually in the United States. One of the earliest instances of such participation was the initiation of state aid to the counties in New Jersey in 1891. By the end of World War I, every state had some form of state participation in highway improvement. Federal highway aid to the states was started in 1916. In 1954, 23 percent of the rural highway mileage of the United States was classified as being in the Federal-aid system.[1]

These assumptions of responsibility by the state and Federal governments for the principal rural roads have resulted in a substantial improvement in a relatively small, but important, segment of the rural highway system. Since the roads transferred to state control were the more heavily traveled ones, the administrative burden of the local governmental units with respect to roads has been substantially reduced. This reduction has been reflected in the disappearance of the township (or town) as a unit of road administration in 31 states.

Illinois, however, still has three systems of rural highways — (1) state primary system, (2) state-aid or county system, and (3) the local system. In terms of mileage, the primary system comprises 10 percent of the total rural highway mileage, the county system 18 percent, and the local system 72 percent.[2] In 1953, the local system was administered by 1,515 local administrative units.[3] Approximately 30 percent of these units each had less than 40 miles to administer; 6 percent of the units each had less than 20 miles. In 1953 the average size of the road system administered by these units was 48 miles. In four counties — Hardin, Massac, Pulaski, and Williamson — the voters have acted under existing statutes to reorganize smaller administrative units into an administrative unit comprising the area of a county. In Alexander County the entire area outside of Cairo is in one road district.

The rural roads under local control consist primarily of gravel roads (Table 1). Oil roads are important in State Highway Districts 5, 6, and 8 (Chart 1). Graded and drained earth roads comprise 25 percent of the total mileage in District 7. Adequacy of the present system may be better judged,

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[1] *Highway Statistics, 1954*, U. S. Department of Commerce, Bureau of Public Roads (Washington: U. S. Government Printing Office, 1955).

[2] Thirty-Sixth Annual Report of Division of Highways, State of Illinois, for the year 1953, Springfield, 1955.

[3] Counties with the township form of government had 1,408 townships; counties with the commission form of government had 107 road districts.

Table 1. Average Mileages of Rural Roads Administered by Local Road Units in Illinois, 1953

Type of surface	State highway district[a]									State
	1	2	3	4	5	6	7	8	9[b]	
Unimproved	0.41	0.53	0.44	0.36	0.39	1.28	2.79	0.73	4.75	1.12
Graded and drained earth	2.69	3.03	6.21	6.11	6.11	6.61	14.29	7.05	10.40	6.84
Soil surfaced, primarily oil	0.01	2.40	0.31	0.01	16.29	11.72	5.02	12.04	0.47	5.69
Gravel or stone	36.74	30.44	40.61	36.45	34.30	26.73	34.89	22.89	47.15	33.76
Bituminous (low type) (flex-base)	5.60	1.20	0.59	0.19	0.89	0.40	0.09	0.03	0.05	0.88
Bituminous (high type) (solid-base)	0.01	0.01	....[c]	0.03	0.03	....[c]	....[c]	....[c]	....[c]	0.01
Concrete	0.06	0.04	0.01	0.05	0.12	0.03	0.02	0.14	0.15	0.06
Brick	....[c]	0.01	0.01	0.02	0.14	0.01	....[c]	0.01	0.02	0.02
Total	45.52	37.66	48.18	43.22	58.27	46.78	57.10	42.89	62.99	48.38
Number of local road units	119	202	202	173	176	182	179	166	94	1,493

[a] See Chart 1. Highway District 10 (Cook County) is omitted since interest is in rural roads. In the remaining highway districts, units which are coterminous with municipalities have also been omitted.

[b] Includes five local road units, each comprising an entire county.

[c] Less than 0.005 mile.

however, by the number of farms located on each type of road. Classifying the roads upon which Illinois farms are located into two classes — (1) hard surface and gravel, and (2) dirt or unimproved — we find that 12 percent of the farms in Illinois were located on dirt or unimproved roads in 1949.[4] Ten years earlier, in 1939, 28 percent of the farms in Illinois were located on dirt or unimproved roads. However, the total number of farms decreased about 8 percent during this ten-year period. Accordingly, the need for at least some of these roads has diminished.

Scope of the Study[5]

The desirability of administrative reorganization of the large number of local units into a smaller number of larger units will be conditioned by many factors. Only one factor is considered in the study reported here — the likely effect of consolidation on per-mile costs. The results presented may provide a more adequate basis than previously available for evaluating alternative proposals regarding the economic advantages of larger local road administrative units.

Analytical Procedure

The Division of Highways, State of Illinois, collects receipts and expenditures data from government units administering local roads. Costs reported for each of these units for the fiscal

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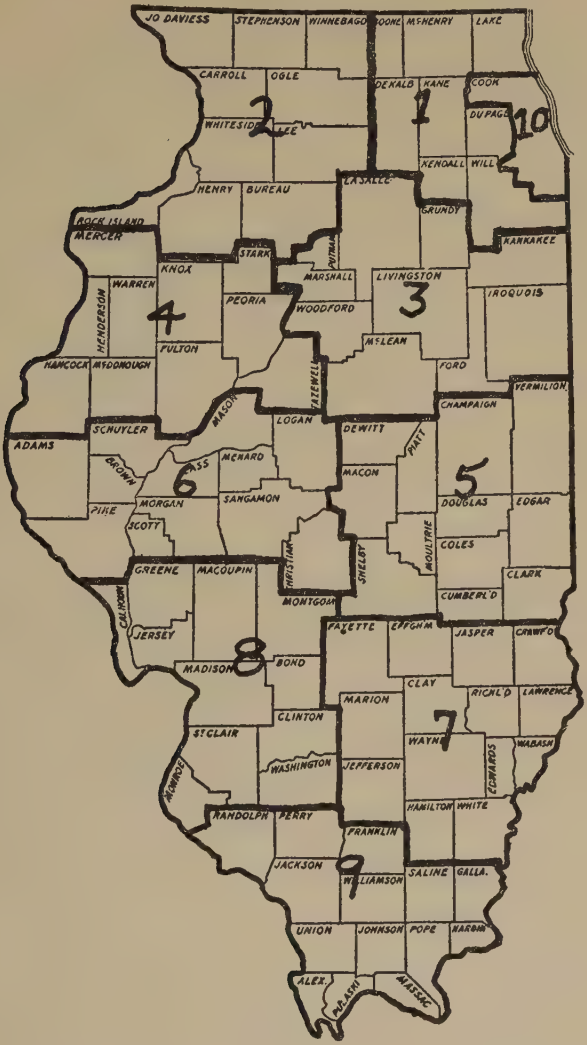
[4] *1950 Census of Agriculture,* Vol. 1, Pt. 5, (Washington: U. S. Government Printing Office, 1952).

[5] Acknowledgment is due the Illinois Agricultural Association, Illinois State Chamber of Commerce, and the Illinois Legislative Council for support of the research of which this article is a partial report. The Division of Highways, State of Illinois, generously furnished cost and mileage information. Access to the facilities of the University of Illinois Electronic Digital Computer (Illiac) made possible the analysis of the large quantities of data. This could not otherwise have been accomplished with the resources available to the project. Professor N. G. P. Krausz had general supervision of the project. Mr. George Brabb was responsible for collecting and processing the data for the portion of the project reported here.

Chart 1. Illinois State Highway Districts



year 1953-54 were divided into three categories: maintenance, administration, and construction. Maintenance costs include all direct labor involved in maintenance operations, operating expenses, and the share of machinery and equipment overhead costs not charged to construction. Administration costs reported are composed chiefly of the commissioner's salary. Construction project descriptions and cost data were obtained from reports submitted to the Division of Highways in connection with the administration of the motor fuel tax funds. The Division of Highways also made available road mileage data collected in cooperation with the Bureau of Public Roads of the Department of Commerce. The number of miles of each type of road surface in each local road administrative unit as of December 31, 1953, was obtained. The average number of miles of each surface type per administrative unit is presented in Table 1.

The central problem in analysis is one of isolating, so far as possible, the relationship between per-mile costs and mileage administered by the unit. Other factors that may be operative in causing differences in per-mile costs among units are differences in types of roads administered, amounts of construction, physical characteristics of the soil, topography, snowfall, frost action, availability of local materials, wage rates, and taxable resources. There are other factors relating to operational efficiency which cannot be appraised from the secondary data utilized in this study. For example, units with the same mileage to administer and operating under similar conditions may have different costs because of differences in managerial ability of the administrative personnel.

To help minimize the effect of such factors associated with location as physical characteristics of the soil, topography, and snowfall on costs, the local road administrative units were first grouped into the state highway districts. The costs of administrative units in each highway district were then studied separately. Grouping into highway districts also reduced the effect of differences among units with respect to wage rates and costs of construction and maintenance materials.

Division of costs into maintenance, administration, and construction also aided in isolating the relationship between per-mile costs and mileage administered by the unit. By performing a separate analysis on construction costs, the cost differences among units due to different mileages of construction in 1953 were taken into account.

After grouping local administrative units into state highway districts and classifying costs, the multiple regression technique was employed to estimate the relationships between per-mile costs and mileages administered by the units. A brief description of the procedure is given in a technical note appearing at the end of this article. In essence, the technique is an averaging process which serves to summarize, in this case, the effects of mileage on road costs after taking into account other variables. In the analysis of maintenance and administrative costs, the causative variables included the mileages of each of the eight different types of road surfaces (Table 1). Since administrative units have the eight types of roads in varying proportions and costs vary depending on the surface, consideration of the mileage of each type of road permitted a more accurate evaluation of the cost relationship than if an aggregate of simply "miles" had been employed. Further, since a preliminary analysis indicated that taxable resources were related to per-mile costs, assessed valuation was included as a variable. Inclusion of assessed valuation tended to ensure that the effect of mileage on costs was a net effect. That is, it helped prevent distortion of the estimated per-mile cost relationships if the wealthier administrative units which typically spent more on their roads also consistently had either low or high mileages of roads to administer.

Table 2. Maintenance and Administration Costs per Mile[a] of Local Rural Roads in Illinois, 1953

Size of local road unit (miles)	State highway district									State[b]
	1	2	3	4	5	6	7	8	9	
10	$722	$341	$375	$383	...[c]	$547	...[c]	$300	...[c]	...
20	540	295	353	287	$325	351	$191	236	$199	$303
30	480	280	346	254	296	285	157	215	147	269
40	450	272	342	238	282	252	140	205	120	253
50	431	267	340	228	273	233	129	198	105	243
60	419	264	338	222	268	220	122	194	96	236
70	410	263	337	217	264	210	117	191	88	231
80	404	...[c]	337	214	261	203	113	188	82	...
90	399	...	336	212	259	198	111	187	79	...
100	395	...	335	...[c]	256	194	108	...[c]	74	...
110	391	...	...[c]	...	255	190	107	...	72	...
120	389	...	...	...	253	...[c]	105	...	69	...
130	...[c]	...	...	...	253	...	...[c]	...	68	...
150	...	...	...	...	...[c]	...	...	...	65	...
200	...	...	...	...	...	...	...	...	59	...
300	...	...	...	...	...	...	...	...	54	...
400	...	...	...	...	...	...	...	...	51	...
500	...	...	...	...	...	...	...	...	49	...
600	...	...	...	...	...	...	...	...	49	...
Number of local road units used to estimate maintenance and administration costs	119	202	202	173	176	182	177[d]	166	94	1,491

[a] A mile in each district is a composite of the eight types of road surfaces in the same average proportion as reported in that highway district (Table 1).

[b] Costs for each highway district weighted by the total number of miles in that district. State average costs computed only for mileages within the range of mileages of all districts.

[c] Average costs were computed only for the sizes of units contained in each district.

[d] Two local road units had incomplete reports; total number of local road units in Highway District 7 is 179.

Costs per mile of construction were also estimated by the multiple regression technique. Cost effects of width of road constructed and thickness of surface applied were considered in determining the average per-mile cost of construction.

Results

Although per-mile maintenance and administration costs were estimated separately (see technical note), the results presented in Table 2 show only the relation of the sum of per-mile maintenance and administration cost to mileage. Maintenance costs were generally about four times as large as administration costs irrespective of the mileage of the administrative unit. For the state average, maintenance costs comprised 82 percent of the total of maintenance and administration costs for units administering 20 miles, and 85 percent for units of 70 miles.

The pattern of decreasing per-mile costs with increased mileages administered by the unit is evident in each state highway district. However, the per-mile costs decrease at a decreasing rate; the cost reductions are greatest in the increases from the lower mileages.

The construction costs per mile presented in Table 3 are for the most common type of construction — gravel applied on graded and shaped gravel or crushed stone. The costs presented assume construction of different mileages at the average width and thickness shown for the particular state highway district considered or for the state.

Application of Findings

That per-mile costs should decrease

Table 3. Construction Costs per Mile of Gravel Applied to Graded and Shaped Gravel or Crushed Stone Using Day Labor in Illinois, 1953[a]

Item	State highway district									State[b]
	1	2	3	4	5	6	7	8	9	
Number of projects	71	48	117	98	32	40	106	48	21	581
Average width (feet)	17.48	15.27	15.01	13.41	14.72	14.10	13.17	13.12	12.95	14.42
Average depth (inches)	5.68	5.23	4.67	4.19	4.06	3.95	3.10	3.77	3.95	4.29
Average length (miles)	1.38	1.73	2.54	1.51	1.75	1.37	1.73	1.65	1.40	1.77
	Cost per mile									
Length of project (miles):										
0.5	$4,356	$4,280	$5,044	$4,780	$6,010	$5,098	$4,490	$3,714	$6,760	$4,759
1.0	3,700	3,643	3,349	3,486	4,033	3,831	3,452	3,198	5,834	3,606
1.5	3,481	3,431	2,784	3,054	3,374	3,409	3,105	3,025	5,525	3,221
2.0	3,372	3,325	2,502	2,839	3,045	3,198	2,933	2,939	5,370	3,029
2.5	3,306	3,261	2,332	2,709	2,847	3,072	2,828	2,888	5,278	2,914
3.0	3,262	3,219	2,219	2,623	2,715	2,987	2,759	2,853	5,216	2,837
3.5	3,231	3,189	2,139	2,561	2,621	....[c]	2,710	2,828	....[c]	....
4.0	....[c]	3,166	2,078	2,515	2,551	....	2,673	2,810	....	....
4.5	....	3,148	2,031	....[c]	2,496	....	2,644	2,796	....	....
5.0	....	3,134	1,993	....	2,452	....	....[c]	....[c]	....	....
5.5	....	3,122	1,962	....	2,416	....	....	....	....	....
6.0	....	....[c]	1,937	....	2,386	....	....	....	....	....
6.5	....	....	1,915	....	2,360	....	....	....	....	....
7.0	....	....	1,896	....	2,339	....	....	....	....	....
7.5	....	....	1,880	....	2,320	....	....	....	....	....
8.0	....	....	1,866	....	2,303	....	....	....	....	....
8.5	....	....	1,854	....	2,289	....	....	....	....	....
9.0	....	....	1,843	....	....[c]	....	....	....	....	....
9.5	....	....	1,833	....	....	....	....	....	....	....
10.0	....	....	1,824	....	....	....	....	....	....	....

[a] Construction performed with equipment and personnel of local road administrative unit with necessary additional labor hired by the day.

[b] Costs for each highway district weighted by the number of projects in that district. State average costs computed only for mileages within the range of all highway districts.

[c] Average costs were computed only for the sizes of projects occurring in each district.

with larger units is, of course, not surprising. The magnitude of the per-mile cost decrease is, however, the factor that needs to be weighed carefully against such factors as "home rule" in considering the desirability of enlarged local administrative units. The costs reported here are suggestive of the amount of expected savings from a system of larger units.

The evidence is rather compelling in regard to the cost reductions up to 60 or 70 miles; approximately 20 percent of the local road units have over 60 miles of roads. A comparison of the costs (using state average figures from Tables 2 and 3) of one 60-mile unit, two 30-mile units, and three 20-mile units will suggest the amount of savings from a system of larger units. Assuming that 5 percent of the total mileage is new construction of gravel applied to a previous gravel surface, we have the following costs:

	One 60-mile unit	*Two 30-mile units*	*Three 20-mile units*
Maintenance and administration costs (60 miles)	$14,160	$16,140	$18,180
Construction costs (3 miles)..	8,511	9,663	10,818
Total.....	$22,671	$25,803	$28,998

The expected cost saving by consolidating two 30-mile units into one 60-mile unit is about 12 percent; by consolidating three 20-mile units, about 22 percent.

The five county-wide administrative units are all located in State Highway District 9. However, only one of these units has over 400 miles. Of the total of 94 units in District 9, only 11 have over 100 miles of roads to administer. Consequently it is not believed that adequate experience is present for drawing inferences regarding the cost reductions resulting from consolidation into county units.

The evidence regarding expected savings appears to be substantial enough, however, to warrant consideration of action to merge at least the very small units into larger units. Such merging is at present permissive. In the last session of the General Assembly, passage of Senate Bill 696 would have eliminated allocation of motor fuel tax funds by the state to local rural road administrative units with less than 20 miles (it is currently required that 10 percent of the motor fuel tax funds be allocated to local rural road administrative units). This bill was defeated. Since the motor fuel tax funds comprise a rather small share of the total receipts (7.4 percent in 1952) of local rural road administrative units, passage of the bill would only have provided an incentive for the units under 20 miles to merge into larger units; it would not necessarily have eliminated them. Increased awareness by the voters of the possible savings accruing from merging should spur the almost inevitable trend toward larger units of local road administration.

Technical Note

To illustrate the procedure of estimating costs, we present as an example the following cost equations based on 177 local road administrative units in Highway District 7:

$$1.\quad Y_m = -328 + \underset{(119.07)}{191.85X_1} + \underset{(28.52)}{29.43X_2} + \underset{(34.41)}{93.18X_3} + \underset{(16.74)}{71.39X_4} + \underset{(470.53)}{278.16X_5} - \underset{(11063)}{6930X_6} - \underset{(1358)}{1010X_7} - \underset{(12994)}{3865X_8} + \underset{(0.051)}{0.481X_9}$$

$$2.\quad Y_a = 273 + \underset{(24.224)}{67.845X_1} + \underset{(5.819)}{0.869X_2} + \underset{(7.019)}{24.292X_3} + \underset{(3.413)}{22.081X_4} + \underset{(95.9)}{42.5X_5} + \underset{(2246.9)}{2942.4X_6} + \underset{(276.8)}{319.6X_7} + \underset{(2637.1)}{465.1X_8} + \underset{(0.010)}{0.046X_9}$$

where Y_m = maintenance cost (dollars)
Y_a = administration cost (dollars)
X_1 = unimproved roads (miles)
X_2 = graded and drained earth roads (miles)
X_3 = soil surfaced, primarily oil roads (miles)
X_4 = gravel or stone roads (miles)
X_5 = bituminous (low type) roads (miles)
X_6 = bituminous (high type) roads (miles)
X_7 = concrete roads (miles)
X_8 = brick roads (miles)
X_9 = assessed valuation (thousands of dollars)

The number in parentheses immediately below each regression coefficient is the standard error of the regression coefficient.

To find the average variable maintenance or administration cost per composite mile, each of the regression coefficients corresponding to a road mileage variable (X_1 through X_8) is multiplied by the average percentage of that particular type of road in Highway District 7 (see Table 1). For the maintenance cost equation we have (191.85) (4.889%) + (29.43) (25.017%) + . . . − (3865) (0.003%) = $68.26 as the average variable maintenance cost per composite mile. To determine the total fixed maintenance cost the assessed valuation X_9 is assumed to be at its mean value ($4,030,000). Multiplying this value by the regression coefficient for X_9 and adding the constant (−328), we get $1,610 as the fixed maintenance cost.

An identical procedure is followed with equation 2 to obtain average variable administration costs and total fixed administration costs. For Highway District 7 these values are $19.50 and $458 respectively. Adding the fixed maintenance and administration costs we get $1,610 + $458 = $2,068, Adding the variable maintenance and administration costs per composite mile we get $68.26 + $19.50 = $87.76. The total cost per composite mile may then be computed for any mileage within the range of the observations. For example, the cost per mile of a 20-mile unit would be $2,068 divided by 20 plus $87.76 or $191.16 (see Table 2).

Construction costs were also estimated by the multiple regression procedure. Taking as an example the 106 projects in Highway District 7 involving the application of gravel to a surface of graded and shaped gravel or crushed stone, we have the following equation:

$$3.\quad Y_c = -4086 + \underset{(158)}{2413X_1} + \underset{(72)}{116X_2} + \underset{(176)}{1160X_3}$$

Where Y_c = construction cost (dollars)
X_1 = length of project (miles)
X_2 = width of surface applied (feet)
X_3 = depth of surface applied (inches)

At the average width (13.17 feet) and average depth of surface (3.10 inches) for this group of projects the total fixed costs are (116) (13.17) + (1160) (3.10) − 4068 = $1,038. Using the coefficient of X_1, $2,413, as the variable cost per mile of road constructed, the total cost per mile for mileages within the range of data may be estimated by dividing total fixed cost by the mileage and adding $2,413 (see Table 3).

The cost equations had the following multiple correlation coefficients; all are statistically significant at the one percent level of probability:

	Cost equations		
Highway district	*Maintenance*	*Administration*	*Construction*
1	.93	.74	.80
2	.90	.71	.71
3	.79	.60	.70
4	.61	.66	.81
5	.84	.66	.98
6	.91	.73	.79
7	.76	.66	.84
8	.81	.74	.93
9	.92	.78	.79

The Theory of Central Bank Reserves

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OVER TIME many aspects of central banking[1] policies have been subject to change. Legal reserve requirements are no exception and it is not unlikely that further revisions will be considered in the future.

Legal reserve[2] requirements for central banks involve several interesting theoretical points. Indeed, the question arises as to whether legal reserve requirements are necessary at all. To answer this question one must examine first the theoretical reasons for the establishment of such requirements and then their practical effects.

I.

The theory behind the setting of legal reserve requirements for central banks has changed several times in the last 150 years. Until approximately 100 years ago the United States and England followed what was called the "banking principle" in connection with all banks of issue. Adherents to this principle believed that the supply of bank notes in a nation could be most satisfactorily adjusted by allowing both central and other bankers to use their own judgment in the issuance of notes. These notes were to be backed only by general assets. It was asserted that such notes would be issued merely in response to normal and productive lending and investment operations. Experience with this banking principle, however, was very disappointing largely because hundreds of banks — including those with irresponsible management — were given the note issue privilege. The banking principle, it would seem, is designed to work most effectively when the central bank is the only bank of issue.

In the end there was a switch to the "currency principle" in order to protect the public. Under the currency principle the government regulates bank note issues, and reserve and collateral requirements are set for notes and deposits. This system has been continued to the present day and has been applied to the Reserve banks. The regular commercial banks no longer issue their own notes.

In the Federal Reserve Act of 1913, note and deposit liabilities of the Reserve banks were made subject to the following legal reserve requirements: 40 percent in gold or gold certificates for Federal Reserve notes in circulation and 35 percent in gold or lawful money for deposits. In 1945 these requirements were reduced and both types of liabilities became subject to a uniform 25 percent reserve requirement of gold certificates. Federal Reserve notes were given no special treatment because it became clear that the two types of Reserve bank liabilities — deposits and notes — were interconvertible.

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[1] In this discussion the term "central bank" refers to the 12 Federal Reserve banks and their respective branches, not merely to a single regional reserve bank. These banks constitute a functional unit controlled to a large degree by both the Board of Governors of the Federal Reserve System and the Open Market Committee.

[2] The legal reserves of our reserve banks consist of gold certificates. These are held against deposits and Federal Reserve notes outstanding. At present the minimum requirement is 25 percent. These reserves should not be confused with the legal reserves of the member banks. The latter consist of member bank deposits at the Federal Reserve banks. Changes in member bank reserves do directly affect the quantity of credit. This article does not deal with member bank reserves but rather with central bank reserves.

The theories behind these central bank legal reserve requirements originally stressed the protection of the liabilities of the Reserve banks and the creation of confidence in these liabilities on the part of the public. Later, reserve requirements were deemed necessary as a guide to central banking policy — to limit and control the credit expansion of the central bank and to curb the use of discretionary powers by Federal Reserve authorities. Finally, central bank reserve requirements have been considered necessary in order to adjust international payments.

II.

Just how have these various theories worked out in practice? Originally the plan was to achieve protection through redemption. As far as the protection of the currency and bank deposits of the United States is concerned, one is reminded that legal reserves today are in the form of gold certificates representing virtually the entire gold stock of the country and that these gold certificates are not intended to circulate. There is no redemption of existing notes or deposits in gold. Under our present limited gold bullion standard, Americans are not permitted to own refined gold, with the exception of industrial users licensed by the Treasury Department. Americans are permitted to own up to 200 troy ounces of gold sponge — the residue after heating gold to a point at which mercury is drained off but at which the gold is not melted. They are also allowed to buy gold dust but have shown little interest in doing so, according to W. Randolph Burgess of the Treasury Department.

Thus, without gold redemption the legal reserve requirements of the Federal Reserve no longer provide this type of protection for the country's notes and deposits; furthermore, Federal Reserve authorities doubt that public confidence in the Reserve banks is affected by the status of their legal reserve ratios. Allan Sproul, for example, recently made a statement before the Subcommittee on Economic Stabilization to the effect that public interest in matters of Federal Reserve bank operations does not seem to be great nor intense.[3] Some observers feel that the only obvious point of contact between the Reserve banks and the public and the only operation evident to visitors is the handling of currency and that even here the contact is indirect, as the Reserve banks are wholesalers, not retailers, of money.[4]

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[3] *United States Monetary Policy: Recent Thinking and Experience,* Hearings Before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report, 83rd Congress, December 7, 1954.

[4] "The Bankers' Bank in Cleveland: A Leader's Role," *Business Week,* March 17, 1956, p. 188.

The question may now be asked, Have reserve requirements served as a imitation on bank credit and as an escape from so great a dependence upon the use of discretion in the management of the Reserve banks? It must irst be asked whether the Federal Reserve has been guided in its policy by ts reserve position, and if so, what the outcome has been. For the most part t happens that the Reserve banks have not been guided in their action by availability of excess reserves. As Goldenweiser[5] has pointed out, the Federal Reserve banks have had large excess reserves throughout the greater part of heir existence and yet credit has not been expanded in a dangerously inflationary way. In 1920 when there was not an ample volume of excess reserves, an exception occurred and the Reserve banks were motivated by their reserve ratio. They contracted credit. In this deflationary period following World War I, there was much adverse criticism of the central bank for intensifyng the depression. Consequently, durng and after World War II when the egal reserve ratio again fell (from over 90 percent to 40 percent), and when there was again some talk of a postwar depression, Congress stepped in to prevent a possible recurrence of the 1920 ituation. The legal reserve requirements were lowered to 25 percent. From now on it seems that one may expect Congress to alter the ratio to suit circumstances.

Certain episodes occurring in the hirties also indicate that whether or not the Reserve banks expand or contract credit is mainly a discretionary matter in the last analysis. The rigid reserve requirements for Federal Reserve notes during that period led to the Glass-Steagall Act, which eased the pressure on gold reserves by permitting the use of government bonds as backing for Federal Reserve notes. During that period too, arrangements were made to supplement the nation's currency by the issuance of additional amounts of national bank notes and Federal Reserve bank notes. Some economists have pointed out that these changes would have been unnecessary if the banking principle rather than the currency principle had been followed in the Federal Reserve Act.

To further lessen the rigidity of the legal reserve requirements, the Federal Reserve Act gives the Board of Governors power to suspend the reserve requirements of the twelve Reserve banks for thirty days and to renew such suspension for fifteen-day periods, meanwhile establishing a penalty payment on the amounts by which reserves are deficient. This power to suspend was used in March of 1933 but there was no renewal of the suspension because of the return flow of gold after the Banking Holiday. Thus, it appears today that in theory the Reserve banks do not need legal reserve requirements in order to control the expansion and contraction of credit, as they have not in general been motivated by their reserve position in the past, and furthermore, in the few earlier cases in which their reserve position did serve as a guide, results were disastrous. Later either the Board of Governors or Congress came to the rescue of the Reserve banks by setting aside or scaling down legal reserve requirements.

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[5] E. A. Goldenweiser, *American Monetary Policy* (New York: McGraw-Hill, 1951), Ch. 3.

III.

If any one factor is the guide for Reserve bank action today it is best expressed by the Employment Act of 1946. Although this act applies to government agencies and departments rather than to quasi-governmental bodies, members of the Federal Reserve Board of Governors have expressed a willingness to be guided by it. Thus one could say that the goals of the act as interpreted by the Board of Governors set limits to central bank discretionary actions today. Federal Reserve policies are aimed at sustaining growth in the American economy while maintaining, so far as possible, high employment and stable prices.

Our reference to the FRB as a quasi-governmental body raises the question, To whom is the Board responsible? An answer might be found in the remarks of Federal Reserve officials at congressional hearings a few years ago.[6]

In the opinion of Allan Sproul it has been the continuing intent of each succeeding Congress that the Federal Reserve banks should be allied to the government, but not a part of the government. It was further pointed out at the hearings that while the Board of Governors of the Federal Reserve System is an independent establishment of the government and holds many powers, other powers have been given to the privately owned regional reserve banks, and still others to a combination of these two. Thus powers have been distributed to assure group judgment and a degree of decentralization in administration. One should never forget, of course, that Congress created the Federal Reserve System, has often modified it, and could make further changes, even those involving abolishment. Knowledge of those facts places a further restriction on the use of discretionary powers.

Both in and out of Congress, many have been reluctant to see the Federal Reserve authorities given extensive discretionary powers. They believe that this may easily lead to various forms of excesses. A. G. Hart[7] and others have pointed out, however, that in the field of banking, discretionary powers may be applied in a comparatively impersonal and equitable way, reflecting few, if any, of the dangers often associated with them. Hart holds that monetary policy is one of the most promising evenhanded measures influencing the economy through incentives. In the monetary-fiscal field discretionary authority may be tied down by general rules that remove the temptation for abuses.

One should also bear in mind tha today discretionary powers are exercised by authorities who are much better informed than were those of ar earlier era. The Reserve banks have worked intensely to develop sources o information to guide their thinking. For example, in the March 17, 1956, issue of *Business Week* magazine, President Fulton of the Cleveland Federal Reserve Bank is quoted as stating that he considers the gathering of information on the activities and plans of businessmen and bankers to be the single most important activity of that central bank because without this knowledge it is impossible to decide whether to ease or tighten credit. Allan Sproul has also made an excellent statement on this subject of discretionary power:

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[6] *Monetary Policy and the Management of the Public Debt,* Part II, p. 646 ff., Hearings Before the Joint Committee on the Economic Report, 82nd Congress, 1952 (Washington: U. S. Government Printing Office).

[7] A. G. Hart, *Money, Debt and Economi Activity* (New York: Prentice-Hall, 1953) Ch. 29.

> . . . we are . . . humble enough to recognize that the power we wield is a circumscribed one which cannot be wielded arbitrarily or capriciously. In the first place, it is a power exercised by a group of individuals of differing backgrounds and talents, and with differing approaches to the policy actions upon which they must finally agree. There are checks and balances such as are characteristic of our whole concept of government, which give assurance that decisions will be reached by a deliberate process, and that power will not be wielded by an individual who might acquire the habits of a despot. In the second place, it is power exercised in the white light of full disclosure: weekly, monthly, and annually our actions are publicly reported for all to examine and judge. Finally, it is power exercised within the limits of national objectives and public tolerance, which would not permit the Committee to indulge a sense of power or to experiment rashly with it, even if it were so inclined.[8]

Indeed, it seems that we may leave this point by observing with Goldenweiser that for moderation in policy there is no escape from dependence on the discretion of Federal Reserve authorities.[9]

IV.

We come, finally, to the argument that central bank reserves are needed in order to adjust international payments and to serve as a contingency reserve against possible foreign repatriation of American dollar assets. In the case of the United States it appears that this point carries little weight at the present time. The United States' gold supply is far from being deficient, and there seems little likelihood that those with a legal option of withdrawing gold under our limited gold bullion standard arrangements will exercise that right. Today gold is no longer such a scarce commodity. Dr. M. A. Kriz of the Foreign Research Division of the Federal Reserve Bank of New York has recently issued a statement that the 6-percent increase in the annual rate of gold production which marked 1954 has been maintained in 1955, representing a sharp acceleration of the rate prevailing in the previous postwar years when it averaged only 2 percent. During this last year two-thirds of the newly mined gold has gone into the monetary reserves, whereas from mid-1950 through 1953 this proportion was only about one-third.[10] According to Dr. Kriz, the United States has no cause for apprehension in the matter of distribution. The United States holds 60 percent of the world's $38 billion in monetary gold stock. In the year ended last September 30 gold stocks outside the United States rose by $800 million. In the same period holdings of the United States declined by $118 million. In addition, most other nations today consider their monetary reserves to be not only their gold holdings but also their dollar holdings. At the end of 1955 total monetary reserves of foreign countries and international institutions amounted to $31.4 billion. Monetary reserves outside the United States are some 80 percent above the postwar low touched in 1946.

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[8] Allan Sproul, "Reflections of a Central Banker," *Journal of Finance*, March, 1956, p. 8.

[9] E. A. Goldenweiser, *op. cit.*, Ch. 3.

[10] Cited by E. H. Collins in "The 1955 Pattern in Gold," *New York Times*, February 13, 1956, p. 34.

When questioned about the likelihood of gold withdrawals by other nations, W. Randolph Burgess of the Treasury Department has said that he thinks it highly unlikely that foreign governments and central banks will exercise their right to make gold withdrawals. Although some economists have contended recently that a large part of our $21.7 billion gold stock could at any time be withdrawn by foreign governments and banks with various convertible balances, Burgess does not feel that this is a problem today. Foreign monetary authorities have applied progressively less of their total reserves to the purchase of gold from us during the last three years, and in 1955 foreign gold transactions with the United States were the smallest that they have been for a period of many years. In 1955 foreigners purchased only $68 million of gold in this country — a drop from $327 million in 1954 and $1.2 billion in 1953.[11] One final observation may be offered. If our central banks were freed from gold restraints, our ability to meet any foreign demands for gold might, in fact, be strengthened because of the greater availability of gold for export purposes.

V.

In conclusion, then, it appears that from the *theoretical* standpoint our central banks do not need rigid legal reserve requirements in order to protect their liabilities, to create confidence, to limit credit expansion, to act as a restraint on the use of discretionary powers, or to carry on international transactions. This does not necessarily mean that we ought to drop legal reserve requirements at this point. Instead, allowances must be made for psychological factors in the picture. In our nation gold has been associated with our monetary system since Alexander Hamilton's day under a number of standards — bimetallism, gold coin, and limited gold bullion. Thus a tradition has been long established, and many, perhaps most, individuals believe that "sound" money cannot exist unless there is in some way a gold linkage. Rather than take chances on the development of unpredictable types of chaos in important sectors of the business world, abrupt changes in monetary policy should be avoided.

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[11] "International Gold and Dollar Flows," *Federal Reserve Bulletin*, March, 1956, p. 219.

The Meaning and Validity of Economic Theory*

A Review Note

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THIS is the late Professor Rogin's thesis: "Ultimately a social scientist must do the same thing a natural scientist does. Both check theory for its truth. But in the social sciences, where reference is not to a constant external nature but to the everchanging historical configuration of human affairs, theory which does not orient itself to the requirements of contemporary practice feeds on the bare bones of bygone practical issues and is destined to be both socially reactionary and scientifically sterile" (p. 13). There is no getting away from social issues. Therefore, to grasp the *meaning* of any given body of economic theory one must know what social problems and practices its author was concerned with, which he shunned, and how he went about all that. On the other hand, to judge the *validity* of any given theory, it is necessary to ascertain what were actually the central issues of the author's time, or of that span of time over which he thought his reasoning might apply.

If a theory consistently addresses itself to a selected social problem, or a congeries of related problems, it is meaningful theory; if the selected problem, or congeries of problems, was or remains crucially at issue, and the theory approaches the issue in an actionable and not simply a visionary way, then the theory may be classified as a valid one. Thus Adam Smith's theorizing is meaningful throughout, because it is woven firmly around the grand theme of economic development. All of Smithian reasoning builds up a strong case for the free mobility of capital, to be invested where it will do the most good in advancing popular living standards. It is really quite sterile to argue that certain Smithian concepts, for example the concept of rent, are meaningless because Adam Smith said one thing in one part of *The Wealth of Nations,* and something apparently contradictory in another part of the book.

True enough, Adam Smith considers rent to be a part of natural price in his discussion of value, but speaks of rent as if it were a monopoly price in his discussion of distributive shares. But both passages make sense in the reference framework of economic development, Adam Smith's paramount interest. The point is that Smith accepted without much question (other than ironic asides) what we now call a "degree of monopoly." It was not a burning issue so far as he was concerned; so he lumped rent under the category of natural price, later on indicating that he was by no means hoodwinked into placing rent on the same high level of distributive equity as for instance wages. But in Smithian economics increasing rents symbolize economic progress, whatever their social justice status might be, and economic progress is what mattered to Adam Smith. So the theory is entirely meaningful, but the next question is, How valid is it?

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* Leo Rogin, *The Meaning and Validity of Economic Theory: A Historical Approach* (New York: Harper and Brothers, 1956, pp. xvii, 697. $6.50)

Rogin clearly shows that Adam Smith, in his consistent advocacy of a tough anti-mercantilistic policy, was most desirous for more capital to be freed (from the clutches of the city foreign trade merchants), to become available for financing "high farming" on a businesslike basis. This would greatly assist in raising living standards for the broad masses of people, he believed; thus, by broadening the extent of the market, the agricultural revolution of commercial and scientific farming would also encourage the division of labor and with it the industrial revolution. But Professor Rogin asks: "Was this really the central economic welfare issue of the times?" Was it not rather the social stress occasioned by the agricultural and industrial revolutions going on at the same time?

In this respect — the burdens of rapid economic transition in an unregulated profit economy — Smith expressed himself in a very limited way. He was skeptical about trade unionism, labor's self-help mechanism; he saw no future for joint stock corporations; and he was outright opposed to social legislation. Yet these were the very forms of social organization that had to be developed in order to make the capitalistic economic system viable. Adam Smith failed to discern and argue for precisely those institutions upon which we have increasingly come to rely as media of continued technological and social progress, and he signally overlooked the need of assigning the political state any constructive role in all of these affairs. Instead, he used his theoretical apparatus to provide intellectual sanction to a policy of state irresponsibility in such matters. Naïvely, he recommended a trickle-down policy of prosperity primarily based on agriculture. It has never been possible to live with such sweeping "economism," or to rely on the thought that what is good for one economic interest group is good for the nation. Adam Smith's theory must be adjudged as being of limited validity, even for his time.

This illustrates the manner in which Rogin discussed how we should undertake to appraise an economic theory. "Criticism which has proceeded without explicit reference to historically conditioned practical ends has involved a waste of moral energy. The present study aspires to help reduce this waste" (p. 13). This being Professor Rogin's fundamental aim, let us see how he goes about articulating what may be called his "economics for economists." Keynesian economics represents a case where much moral and nervous energy was wasted by many "critics" who innocently, or more or less willfully, misapprehended the meaning and validity of this body of economic theory. The following thumbnail sketch of Rogin's treatment of Keynes is presented (1) in order to show exactly what Rogin, in his approach to the evaluation of theory, seeks to do, and how; and (2) for the purpose of illustrating what Rogin had to say not only about Keynes but about a whole roster of noted economists, starting with the Physiocrats.

I.

For the longest part of his career Lord Keynes accepted the traditional belief in a long-term natural rate of interest, some level of which was conceived to balance the supply and demand for loanable funds under given economic conditions — and always in such a way as to guarantee full employment. In this confidence Keynes devoted most of his criticism not to traditional economic theory, but to the way it was being applied by the monetary authorities of England and the United States Federal Reserve System. This involved treating economic fluctuations primarily as the results of transitory price fluctuations well within the powers of the currency authorities to control. For instance, when real wages were to be cut after World War I, according to the classical prescription for restoring full employment conditions in the changed world market situation, Keynes did not argue that it should not be done. He only argued about the way in which it should be done. He advocated, in effect, that it should be done by giving up a traditional exchange parity of the pound sterling, thus letting import prices rise — rather than venerating the sacred cow of traditional exchange parity magnitudes and therefore putting real wages through the wringer of deflation. From this they might emerge, Keynes predicted, considerably more squeezed than need be, besides being soiled by the acid resentments of workers who have lost strikes against wage cuts. Thus, although Keynes was in a real sense "on the side of the workers," it is also true that in 1926, again in 1931, and as late as 1933, he was essentially a Liberal in the old, eighteenth century meaning of the word.

Only in 1936, when he already had a long and brilliant "future" behind him, did Keynes give full recognition to the "transitory interval" between long-term balances of savings and investment, as intervals fraught with the deepest social implications and consequences. He saw — as Malthus did before him, and for that matter Ricardo too — that in the framework of short-run events and people's economic behavior, all sorts of possibilities might exist to ease the burden of widespread economic distress. Time did not permit leisurely academic probes of all these possibilities in all their possible long-run consequences. So Keynes took the calculated risk — a beautifully ethical risk — of getting on with some fundamental policy recommendations. Admittedly some of them were constructed in haste, and erected only very shakily on the solid (if slim) pillars of inherited Cambridge wisdom. That is all Keynes ever did; he neither intended nor actually fomented an intellectual revolution. And haste, not rebellion, is all the Cambridge dignitaries ever accused him of; this reviewer knows, having interviewed some of the Cambridge luminaries while studying at Cambridge right after *The General Theory* was published.

In 1936, Keynes' strategic depression controls still included giving the business community monetary and fiscal incentives to resume economic expansion. But other controls crept in, unconventional ones, such as the use of public loan expenditure ("deficit financing") as a means to prosperity. Great moral indignation now welled up, for it seemed that Keynes was prepared to let the government become a partner in the capital market on a scope far more extensive than its conventionally restricted one of raising money to finance the state's traditional night watchman's functions. Keynes even let slip some remarks that this sort of thing might last forever. "Slips" they were, I say advisedly, for again I found upon personal inquiry that this whole to-do about "socialized investment" is based on what was more in the nature of a casual remark than of the quality of well-rounded theoretical articulation.

Another wave of moral indignation swept toward Keynes (and the Keynesians) when it was discovered that he would have nothing to do with wage cutting as a way out of depression. Instead he advocated that the long-term rate of interest should be held down to a low level as long as unemployment exists, by letting it be known that the monetary and fiscal authorities would pursue "cheap money" policies to that end. This would give prospective investors the needed incentive to place their money into real investment right now, instead of waiting for a happy day when the pure rate of interest on gilt-edged new assets might have risen far above 2 percent. More indignation still. Keynes seemed to be saying that industrial progress was to be stimulated not by the virtue of increased saving, but by the outpouring of cheap money through the agency of currency authorities who were in cahoots with government authorities. Under the dispensations of classical economics, frugality was the mainspring of savings that would be used by daring enterprisers, to hire everybody willing and able to work at a "sound and realistic" rate of wages. The savings and investment balance was in a deeper sense a virtue and venture balance.

According to Keynes it would not be the exercise of individual virtues, but only suitable social organization which might get the national income up to the full employment level, and keep it there. If classical economic theory, which posited an almost total measure of economic irresponsibility on the part of the democratic state, would not reach to the compelling facts of actual or impending misery, "so much the worse for theory" — that is how Keynes felt about it. But this did *not* prompt him to abandon established theory; he tried to make theory reach to the facts and necessities at hand.

"Today we are all Keynesians," Professor Rogin says, in one of the most genial footnotes in his book (pp. 679-80). Many are right-wing Keynesians (in that they prefer to limit government intervention to monetary and fiscal actions); some are left-wing Keynesians (in that they look forward to some form of democratic public and private investment coordination); but "we are all Keynesians." One might quarrel with Professor Rogin about that — had he said it in a very literal and profound sense. As an aside, though, it does serve to emphasize that the meaning and validity of the latter-day theories of Keynes must be appraised in terms of his technical and ethical concern to keep economic theory alive by attuning it to the needs of the times and the requirements of practical policy making. This is now so well understood that the shouting has all but died down. How much good might have been done, how much backbiting and heeldragging might have been prevented — in political and practical as well as in academic affairs — had Rogin's approach to theory appraisal been widely understood twenty years ago!

II.

The same kind of wasted energy might have been saved if the long-drawn-out correspondence and controversy between Malthus and Ricardo could have been terminated sooner. The issue that existed between them was not one over meaning (though they both thought it was), but one concerning whose theory might be more valid in terms of the practical requirements of those times. Had the protagonists paused to face this question, each might have found that he, as well as his opponent, was not really astride the central issue of his time. Ricardo thought that industrialization, speeded by the repeal of the Corn Laws, would afford such high prosperity to the nation as to permit a decent standard of living to trickle down to the common laborer. Building his reasoning firmly around the theme of rapid industrialization, and dedicating himself to the cause of Corn Law repeal, Ricardo rendered his body of theory entirely meaningful. Malthus foresaw the problem of economic instability under rapid industrialization in a profit economy composed of "a class of proprietors, and a class of labourers." He did not oppose industrialization as such but wished it to proceed at a leisurely pace, one at which the social structure of "merrie olde England," with its strong landed aristocracy, would not be jeopardized by a significant destruction of capital invested in land, such as Ricardo seemed to sanction. Malthus did a very nice job of making this practical preoccupation the basis of a reconciliation of the long-run economics of his *Essay on Population* and the short-run economics of his *Principles of Political Economy*. His body of theory was therefore entirely meaningful.

But the correspondence between Ricardo and Malthus shows that each failed to grasp the meaning and relative validity of the other's approach, and therefore kept probing for logical fallacies in that apparently opposing approach. Had the protagonists in this controversy given up trying to convince each other (as Ricardo ultimately did, but only a short time before his death), they might have realized that they were not opposite in any truly valid sense, that they were not even apposite to the question of social welfare in any direct sense, that in fact they were equally adrift of the central issue of their time, namely, the birth-pangs of machinofacturing in its social implications. Had this been seen, the controversialists might have joined in producing policy recommendations that went to the heart of the matter, recommendations based on Malthus' insight into the social significance of "temporary intervals" and Ricardo's emphasis on long-run productivity considerations.

Their personal intellectual heir, John Stuart Mill, by contrast, was oriented to the central issues of his time. As early as 1829 or 1830 he observed that "Except during short periods of transition, there is almost always either great briskness of business or great stagnation." He also noted that "commercial revulsions" and their aftermaths had become more frequent and violent with the growth of capital and the expansion of industry. This amounts to acknowledging that what is "natural" or "normal" about price is a succession of alternating short-run price levels rather than any pronounced long-run equilibrium tendency. Indeed, long-run equilibrium price exists for Mill only in what he calls "a short period of transition" — in an unfortunate inversion of the customary and as yet usual use of that phrase. Yet it was on this rare and unusual upside down "short period of long-run equilibrium" that Mill fastened his attention. His reform impulse being strong, he felt the central issue of his time to be that of getting away from the wages system to a cooperative commonwealth. This was to be accomplished by a gradual "improvement" of the institution of private property, with profit sharing and abolition of "unearned increments" standing as milestones on the road to the good society. Little did Mill comprehend that the actual historical context of economic fluctuations, which he saw and described, furnished about as unfavorable an environment as could be imagined for the emergence of "the association of the labourers themselves on terms of equality, collectively owning the capital . . . and working under managers elected and removable by themselves." This Rogin incisively points up (p. 328).

One must not ask why John Stuart Mill turned his attention from the central issue of economic dislocation, an issue in terms of which he might have blended the best in Ricardian and Malthusian thinking on this subject, and, adding his own work, might have emerged with a highly valid theory. What counts is that he failed to accomplish this. The rest is a personal matter which must not detain us, as Professor Rogin always warned, lest we become involved as amateur psychologists. Mill was the flower of the classical school — at a time when, by drifting into humanitarian escapism, it almost went to seed. Let us leave it at that.

The classical school was to receive a life-preserving infusion of thought from philosophy, through the person of Karl Marx. It was he who blended the discordant phrases of Ricardian and Malthusian thinking about economic dislocations into a theory about the "inner contradictions of unrestrained and unplanned capital accumulation" — contradictions that ultimately would be resolved in the socialist state. "With the liberal economists, saving and real accumulation were conceived to be unmitigated blessings," Rogin writes. "There lies the fundamental difference between the economics of Karl Marx and that of the liberal economists. For Marx, not only is accumulation the central locus of the contradictions, the pathology of capitalism, as reflected in the tendency toward declining profits and economic crises and depressions, but both the development and the structural changes in the economy accompanying this accumulation prepare the way for a collectivist economy 'within the womb' of private capitalism" (pp. 333-34). Why then, consider Marx a classical economist at all, since he departs from the premise of the naturalness and permanence of the institution of private property in the means of production?

The virtue of the Rogin approach to interpretation of theory is precisely that it has demonstrated that the hallmark of classical economics is its treatment of institutions as variables in the historical process of social change. In fact, it is not too much to say that Rogin achieved a reconciliation of classical and institutional economics. He did it by showing that from Adam Smith onward the classical economists considered institutions to be man-made and therefore bound to change in the course of what they called Progress. To be sure, Smith, Ricardo, Malthus, Senior, and other classical economists placed a high priority on private property as a matter of individual preference. As social scientists, though, they were not averse to facing up to social change. With John Stuart Mill that became abundantly clear, and the only different thing about Marx is that, so far as he was concerned, facing social change was a matter of urgency, upon which he insisted with vehemence. But that is not a qualitative difference; it is a matter of degree.

Anarchists, philosophical socialists preceding Marx, and other critics of the prevailing social order had characteristically dispensed with any theory of capitalist development. They simply criticized the existing state of affairs and advocated a different kind, but paid no attention to the question of what social forces, if any, might be in existence (or could conceivably come into play) to bring about the change. Marx rejected this as unscientific, utopian socialism. Unless it could be demonstrated that social forces of transition exist, in manifest or latent form, there was no use talking about socialism at all.

Marx's theory of capitalist development is therefore a studied effort at demonstrating the potentials for social change which are generated by the institutions of capitalism itself. In attempting this demonstration he availed himself of work already done on the analysis of the economic system by such men as Ricardo. Marx also used a technique originally employed by Adam Smith — that of formulating a concept of a rational society, understood to be a model economy, then observing how actual historical economics compare when examined in the perspective of the model. To illustrate, in a rational collectivist economy increased productivity would be translated directly into increased labor income. Net accumulation, taking the form of laborsaving innovations, would stimulate the consumer goods industries, with a subsequent expansion of demand for capital installations. Thus increased productivity and increased "consumptivity" would be planfully synchronized, providing for a progressive equilibrium; expanding productive capacity would be uninterruptedly translated into expanding output. The ever-increasing surplus would not create serious difficulty for sustained accumulation. This is the Marxian model, highly simplified, of the rational collectivist state.

Under capitalism, whose chief attribute is to Marx the private ownership of the means of production as a basis to income claims, things work out differently and in such a way as to create a characteristic difficulty in sustaining accumulation. An inflation of capital values arises, because productivity gains are capitalized only with respect to profit-raising cost reductions, and at a compound interest rate, but in abstraction from a required sustaining increase of popular purchasing power. In the Marxian schemata the necessary support for aggregate demand is not likely to be forthcoming, for several reasons: The capitalists have no interest in imputing to labor incomes the productivity increases which they desire to capitalize on their own account; any government which wished planfully to do so would not be acceptable to the ruling class of capitalists; and the bargaining position of labor would, if anything, be weakened by the very process of capitalizing productivity gains immediately, instead of letting them show up as increased labor incomes first. For laborsaving innovations swell the ranks of the "industrial reserve army" of unemployed persons who, in competing for jobs, keep up a constant pressure on wages. This would of course be offset if productivity gains were in the first instance imputed to labor incomes — a planned process which, by sustaining a uniformly progressive economy, would also lead to the industrial reserve army being largely absorbed in employment.

The central issue for Marx was economic instability, with all of its many social ramifications. His consistent adherence to this issue renders his theory meaningful. But he had no *special* theory of crises; he did not believe that the evil of economic fluctuations could be removed from capitalism while yet leaving its fundamental structure intact. "Marx's theory of crises is, in fact, coextensive with his whole theory of the capitalist process" (p. 388). For example, the "industrial reserve army" of unemployed only symbolizes the incomplete material, and particularly *human,* resources development which Marx considered to be the chief attribute of capitalism as he knew it and as he foresaw its future course. Marx believed that underdevelopment of material and human values in particular — not absolute but relative to emergent and seen possibilities — would occur on an increasing scale, leading to increasing social unrest. However, this does not automatically lead to a change of economic institutions. " 'The historical development,' he wrote, 'of the antagonisms, immanent in a given form of production, is the only way in which that form of production can be dissolved and a new form established.' But the new form must be *established.* There is no question of a mere 'growing into socialism.' 'Force is the midwife of every old society pregnant with a new one' " (p. 334).

What do Marx's revolutionary assertions signify for the validity of his theory? Is the use of force, even in "midwifing" social change, an actionable policy recommendation or a visionary one — however grimly intonated? It is Professor Rogin's judgment that this Marxian directive rests on a "'pure' theory of the consequences of the naked exercise of economic power by the class of proprietors" (p. 400). What has actually happened is not the outcome of Marx's schematic capitalism but the outcome of social control and capitalism acting on one another. "Marx clearly did not anticipate the vast extension of the state into the sphere of business enterprise by means of regulation, public ownership, the increasing socialization of capital and the national income by taxation, and the funneling of savings into governmental treasuries in order to provide for collective wants" (p. 363). ". . . in the historical view of the development of 'modern industry' as distinguished from the 'pure' theoretical view, the state was soon to emerge in its new role of defender of the laboring class — in fact, as defender of its very existence" (p. 361). The extent to which social control as exercised through trade unions and social legislation served to limit Marx's "pure" theory of "the law of motion of modern society" is the important thing to note. "And," Professor Rogin writes, "if the role of theory is to guide practice one may then draw the moral, 'so much the worse for "pure" theory'" (p. 408).

In brief, the Marxian theory in its "pure" form lacks validity so far as it scoffs at the hard-won possession of political democracy, a gain which after having been mortally threatened, is now recognized by the workers of the world to be the prized possession it has always been. The Marxian economics retains validity so far as it focuses attention on the persistence of economic instability with all of its grave economic, political, and social implications.

III.

At present there is an overly strong tendency to rehash the practical issues of the 1930's. But the central issues of the 1950's and the 1960's will not evade us. We must get at them. To assist us in this effort, by clearing the methodological ground, was Professor Rogin's chief aim. ". . . the purpose of the present survey of the history of economic theory is not, primarily, to provide a definitive judgment on past schools of theory, but rather to suggest the criteria for the choice and elaboration of general frames of reference — 'principles of economics' — at the present time. . . . All theorizing . . . involves the substitution of highly simplified analogies for a given aspect of the actual historical process. An analogy, a theoretical model, may emphasize relations which are significant for the requirements of policy in a given historical context and yet be highly inadequate, or even misleading, in a different situation" (p. 103).

What is the situation for our time, and what are the principles of economics it requires? Aided by Rogin's dedicated efforts to furnish guidance, we might well seek to answer this question.

Books Reviewed

Nationalization in France and Italy. By Mario Einaudi, Maurice Bye, and Ernesto Rossi (Ithaca: Cornell University Press, 1955, pp. x, 260. $3.00)

This volume, one of the Cornell "French-Italian Inquiry" series devoted to the political, economic, and constitutional problems of postwar France and Italy, considers "in the cold light of the aftermath" the development of nationalization in those politically and economically troubled countries. In his Foreword, Einaudi promises that "in the variety of their origins and in their subsequent political complications [these developments] add many interesting new aspects to the traditionally received image of nationalization." This promise is abundantly fulfilled in this well-organized, well-written, and extremely useful little book.

In Part I, "A Comparative Study of Nationalization Policies," Einaudi discusses general issues involved in the study of nationalization — the several "meanings" of nationalization in different political settings, the relation between nationalization and planning, and the influence (which he finds to be remote) of the Soviet Union upon planning and nationalization in the West; the contrasts between French and Italian nationalization policies, and between the policies of these countries and those of Great Britain and the United States; and the future of nationalization. Einaudi's analyses and judgments are thoughtful and well balanced. If, on occasion, he goes overboard (as when, on page 58, he says "Nationalization in the ultimate analysis is an instrument of despair and an admission of defeat, unless justified by exceptional circumstances," and when, on pages 15 and 16, he labors the primacy of political over economic factors), the reader will bear in mind that nationalization frequently lures men overboard, on both sides of the ship. Part I is designed as an introductory essay; it is well worth rereading as a conclusion.

Part II, "Nationalization in France" (Bye), and Part III, "Nationalization in Italy" (Rossi), discuss in some detail the quite different origins and concepts of nationalization in the two countries; its developing forms and structures; special problems which have emerged; the growth of policies; and the future. The discussion proceeds both generally and by industries. The treatment is thorough, penetrating, and realistic.

The book as a whole offers much that is new to most of us in the way of history, details of organization, and operating problems and records of performance of the nationalized industries of France and Italy. Particularly significant are the accounts of the impact of the political forces peculiar to each of these countries upon the inception, nature, and operation of their respective nationalization projects. "It is in Great Britain that a concept of nationalization more in keeping with its 'ideal' definition seems to have found haven at last . . . The contrast with the Continent could not be greater." Yet, withal, the reader cannot fail to be impressed by the realization that the basic problems of nationalization arise and persist irrespective of the country in which it is undertaken. In Britain, for example, where nationalization seems to be solidly established and, on the whole, well set up and operated, the prevailing worries are much the same as in France and Italy where the status and prospects of nationalization are confused (France), muddy (Italy), and quite shaky and uncertain (both).

Everywhere, nationalization has to meet the demands of operating efficiency which argue for independence from the political machinery of the state, and at the same time it has to meet the demands of responsibility to workers, consumers, and the national interest which require that the state keep a close watch on operations. This means great concern over both internal structure and external relationships — a concern that seems sometimes to approach obsession with "form." Yet it is probably true that while a given organizational structure is not per se a guarantee of efficiency and responsibility, it can and does conduce to these ends; and it serves always to express the clarity with which those in charge of the projects see the real substance of their tasks and the care and vigor with which they approach them. Nationalized industries, of course, are not alone in this situation: private "big business" is also plagued by difficulties of internal organization, and private enterprise as a system cannot be said to be wholly free from problems of over-all public responsibility.

One final comment (not especiall inspired by this book) on the state o the debate. It is really surprising ho many times in discussions of particula nationalization projects one hears th mouth-filling observation, "Well, nationalization has certainly not produce the millennium it was supposed to brin about!" As though anyone ever reall supposed it would — as though millenniums really had any relevance for th appraisal of human political-economi activity. It would be a relief sometim to take up the relative (as distinct fro the absolute) merits of nationalizatio as one way (among several ways) o dealing with a given economic proble in a given setting.

BEN W. LEWIS

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Politics, Planning, and the Public Interest: The Case of Public Housin in Chicago. By Martin Meyerso and Edward C. Banfield (Glencoe Ill.: The Free Press, 1955, pp. 353 $5.00)

This volume is an important attemp to describe, with reference to the determination of certain public housin sites in Chicago, the problems, machinations, and maneuvers of interes groups and the decisions made at various government levels. The book coul have been written about any one of number of other social and politica issues — past, present, and future — and been equally applicable. The firs reaction of a student of politics an government is that there should b more studies like it.

At best, it is difficult for a participan ı the turmoil to review a critique of it. he difficulties are compounded by the act that one of the authors not only as also a participant, but is a friend as ell. Thus, the reader of this review hereby warned in advance.

This reviewer is prone to ruminate n some of his own experiences in this itter fight over the location of public ousing projects in the city of Chicago nd tell some of the many parts of the tory which, incidentally, are not in the ook. Even after fighting off this temp-ation, he must add, however, that here are a number of facts and opin-ons with which he does not agree.

Basically, this book is a study in rustration. It was the frustration of a ell-organized, skillfully led segment of he community which felt the urge of rusader both to better the housing onditions of a large metropolis, and t the same time to take an important nd major stride forward toward better tegration of the races in this northern ity. The recent focusing of attention n the problem of integration through-ut the nation gives added emphasis to is story, for in fact the North itself, espite pious expressions, has much of hich it should be ashamed in this here.

This fight over the location of public ousing sites, as one could guess from e preceding cryptic remarks, was in-eed a bitter one. And the racial over-ones were most noticeable. In the end, e political decisions were based on e philosophy of the dominant Demo-ratic politicians who, ignoring their ational party platform, sided with the estrictionists. The failures of the plan-ers and the "reformers" (if you will) stemmed from their inadequate political base of operations. Despite an impressive mobilization of civic figures (including a huge contingent of the clergy of all faiths), the argument for selecting housing sites on planning and social grounds, as opposed to political expedience, lost. It lost because the mobilized civic leaders and groups had few, if any, political levers with which they could pry the political leaders loose from their individual and neighborhood prejudices.

The moral of the story, I believe, is that any citizen, whatever his beliefs and desires, has little influence if he is unable to translate these beliefs into some type of political action. An elected public official, of necessity, must evaluate, among other things, the ability of the various interest groups descending upon him to translate their beliefs into votes in the ballot box (and this observation applies even to those public officials with the firmest philosophical views). When an elected official must choose between a well-organized interest group which backs his own personal prejudices and a group which supports moral principle but with ineffective political leverage, the outcome too often is all too easy to predict. And this is what happened in Chicago.

Having preached at such length (instead of reviewing), I would like to add only that I think this is a most valuable book, and would hope that we may find other scholars doing as good a job in analyzing similar social-political issues before us.

Robert E. Merriam

Washington, D. C.

American Imports. By Don D. Humphrey. A study jointly sponsored by the Twentieth Century Fund and the National Planning Association, with a policy statement by the Association's Committee on International Policy. (New York: Twentieth Century Fund, 1955, pp. xviii, 546. $6.00)

The closing of the "dollar gap" has been a prime objective of international economic policy since World War II. Although there are indications that the gap has, in fact, been narrowed, it has by no means been eliminated. The desirability of American loans and grants to finance foreign dollar requirements on a continuing, long-range basis has been questioned, both by donor and by recipients. With the recognition that private American investment abroad is likely to play only a moderate role in covering foreign dollar obligations, attention has focused on the possibilities for increasing American imports through reducing import barriers. "Trade, not aid" has become the appropriate slogan. Additional interest in American imports from a strictly national viewpoint has arisen out of a consideration of their role in American economic growth and in national security.

The book under review was apparently stimulated originally by a concern for the elimination of the "dollar gap," but it has turned out to be of much wider significance. It covers the whole range of factors affecting American imports and import policy and is a major contribution to our understanding of a very important aspect of American foreign economic relations. The book is designed primarily for the informed layman, but it is certain to be widely discussed in professional circles as well. One cannot fail to be impressed with the wealth of detail and with the amount of effort in this work. Exposition is uniformly clear, although perhaps slightly repetitious at points. The reader is provided with a great deal of useful material on old and familiar topics (such as the Trade Agreements Program)as well as with much that is new. Among other incidental contributions, the author gives many useful insights into the dynamics of the American economy, a considerable and important topic in itself.

Part I (100 pages) contains a concise survey of the history of the American export surplus of goods and services and of the ways in which it has been financed, particularly since World War II. It also contains comprehensive historical data on the value and volume of United States imports in relation to the long-term growth of the American economy, the business cycle, and tariffs. Part II (140 pages) provides a critical survey of the tariff and its history, the Trade Agreements Program, attitudes toward the tariff, and nontariff barriers to imports, including the American agricultural program. In Part III (100 pages) there is an examination of import potentialities by major commodity groups. Part IV (70 pages) studies the industries that would likely be adversely affected by tariff cuts and gives much useful information on the escape clause provisions of the tariff laws and their administration. A final Part V (40 pages) deals in summary fashion with the future of American imports and offers some tentative policy conclusions. There is appended a statement on an "Import Policy for Security and Progress" by the International Committee of the National Planning Association, in which the Committee broadly concurs in Humphrey's analysis and conclusions.

Among major findings of this study are the following:

1. The author stresses the fact that the American export surplus in goods and services is by no means a new phenomenon, but goes back to the 1870's. What is new is the way it has been financed since World War II, namely, by very substantial loans and grants by the United States government.

2. Imports kept pace with the growth of domestic output from the Civil War to the 1890's, and from 1900 to the 1930's; in the past twenty years they have declined relatively.

3. Imports of crude materials increased as a percentage of total imports until the end of World War I, but declined thereafter; by 1948 they were a smaller proportion of imports than in 1900. The explanation of this development is mainly technological advance and the substitution of domestic materials.

4. Imports are highly concentrated in a few commodities and the degree of concentration is growing; eight items accounted for almost all of the increase in the value of imports between 1929 and 1947.

5. Imports are cyclically more unstable than domestic American output, expanding (and contracting) more rapidly during upswings (and downswings) in activity in the United States.

6. The tariff has been of minor significance in the general growth of the United States; and there is some basis for believing that it has become less rather than more protective. With the possible exception of the Dingley Tariff of 1897, the changes in duties which have occurred since 1872 have not decisively reduced the over-all importance of imports in relation to domestic output.

7. For this reason, and because more than half of American imports are at present noncompeting, a reduction, or even elimination, of present tariff and other barriers to imports would, in all probability, have little substantial overall effect on imports.

8. The sectors of the economy most likely to suffer in the event of a reduction in import barriers are certain branches of agriculture and older nondurable goods industries such as pottery, chinaware, hand-blown glass, textiles, shoes, hats, and floor coverings. These are segments of American industry that are developing more slowly than the rest of the economy and are in difficulties, in any case, quite apart from foreign competition. The consequence of high American productivity, says Humphrey, is to confer a competitive advantage on foreign industries where progress is not important, since the import-competing industries just mentioned are under cost pressure from the more dynamic sectors of the American economy, the latter being in a

position to bid resources away from import-competing industries.

9. In order to realize the benefits of increasing freedom of trade, the mobility of labor and other resources must be high. This suggests that the Federal government, in conjunction with state and local agencies, should assist individuals displaced by tariff cuts in relocating and should aid communities in attracting newer, more virile industries.

10. The Trade Agreements Program has achieved substantial over-all cuts in American tariffs, but not on competitive imports where they are most helpful to foreign suppliers. Indeed, according to Humphrey, Congress, in the escape clause and peril point provisions (under which American producers can obtain relief from foreign competition in the event of "substantial injury"), seems to have intended that cuts on competitive imports should not be made at all. The Tariff Commission has taken a fairly liberal position on this issue in recent years, and the legal aspects of the matter are quite confused.

There are a number of significant arguments in favor of a reduction of American import restrictions. Humphrey has emphasized (correctly in this reviewer's opinion) the political and psychological advantages to the United States of a liberalization of import policy. Since import barriers have not appreciably affected the course of American development or of imports generally, it follows that their elimination would not be of decisive influence in increasing American imports and, therefore, cannot be of much economic advantage — or disadvantage — to the United States or to its trading partners. But the political advantages of a more liberal import policy provide a compelling argument for a substantial reduction in American trade barriers. At a time when protectionist sentiment is mounting, strong leadership by the President and the Executive Branch seems particularly important. Unfortunately, we cannot expect very much in an election year.

BERNARD GOODMAN

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Measuring Business Changes. By Richard M. Snyder (New York: John Wiley and Sons, 1955, pp. xvii, 382. $7.95)

The purpose and scope of this encyclopedia of business indicators is stated by the author as follows:

> This handbook describes and explains the more important national business indicators or indexes and tells where they may be obtained directly or in comprehensive official government publications. Each indicator is "taken apart" sufficiently to show its uses and, perhaps more importantly, to suggest some misuses to be avoided.

In this reviewer's opinion, the author has done all he has promised and he has done it well. There can be no doubt that during his twenty-five years as market analyst for one of the largest and most dynamic chemical companies in the world, Mr. Snyder has come to appreciate the usefulness of business indicators. It is readily understood, therefore, that from his vantage point, he would have liked to have his company's officers know about, and thus better comprehend, these barometers of business activity. Yet I consider it wishful thinking when he states that this book has been written for "the businessman as a reader." If businessmen would read it, there is no doubt that they would benefit. However, the fact remains that most businessmen will be too busy and for most of them the book will prove too difficult. The main beneficiaries will be researchers and students in the field of economics and business.

More than fifty business indicators are examined in this book. They are organized under the following headings: national income and product; population; labor: employment and earnings; commodity prices; production and business activity; construction activity and costs; trade; financial activity; and stock prices.

The book is not analytical in its approach. In a few places the reader may wonder why the book is not more scholarly. For instance in the section on stock prices, there is an excellent discussion of problems arising in the construction of stock price indicators. However, there appear such phrases as "The following method is suggested for consideration by technicians in the field . . ." or "A suggested working procedure is to base . . ." (p. 320). Neither names nor documentation is given.

In more than one respect the fact that another handbook of business indicators has appeared reflects the growth of economic and business research and the need for more ways to feel the pulse of our increasingly complex economy. Snyder's book will help in picking the right indicator and in using it properly.

WERNER Z. HIRSCH
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Price Discrimination in Selling Gas and Electricity. By Ralph K. Davidson (Baltimore: Johns Hopkins Press, 1955, pp. ix, 254. $4.00)

What logic explains the rate structures of gas and electric utilities? What are their effects on the efficient utilization of resources? These are the questions that R. K. Davidson explores. The book is primarily a theoretical study. It contains, however, some historical material in support of the theoretical arguments.

The title of the book suggests the answer to the first question. Various forms of profit-motivated price discrimination characterize practically all rate structures. By price discrimination, of course, is not meant a rate schedule which laws, courts, or regulatory commissions might find discriminatory. What the author does mean is that under practically all gas and electric utility rate schedules, rate differentials do not correspond to differentials in costs. In this respect he follows Machlup. Unfortunately there is a fundamental ambiguity in the definition, for it is not clear which costs are actually relevant.

Rate theories and formulas, and there are many, are carefully analyzed. The "cost of service" arguments as rationale for rate schedules are methodically rejected, and it is argued that "value of service" pricing is simply price discrimination under another name. Three main forms of discriminatory pricing are distinguished. The first is intertemporal discrimination. It occurs because quantities demanded fluctuate over time, and this causes variations in costs which generally are not matched by equal variations in rates charged to consumers. The second is class discrimination, also called third-degree discrimination, in which consumers are divided into classes having different demand elasticities. The producer will wish to charge according to the elasticities even though the cost of serving all classes is the same. The third is block discrimination (second-degree discrimination). It occurs when the total quantity of the product sold to any one consumer is divided into a finite number of blocks such that the first block, consisting of a specified number of units per period, is sold at one rate; a second, also consisting of some specified number of units which can be bought only after the first has been purchased, is sold at a lower rate; and so on for a third, fourth, or even more blocks. Since costs are determined by the total quantity supplied, this type of rate schedule is clearly discriminatory.

Block discrimination receives particular emphasis in the study, apparently because its price-output consequences have not been pursued in the public utility economics literature. Actually, the formal analysis is advanced little beyond Pigou's *Economics of Welfare,* published many years ago. New, I believe, is a graphical solution for the case in which the demand schedule for all consumers is identical but nonlinear. Interesting also is an attempt to take account of the interdependence, because of income effects, of the position of the demand curve and the widths of blocks. The problem, however, is a difficult one and income effects are largely ignored in the formal analysis. A further important limitation is that for purposes of analysis the demand for all consumers is assumed to be precisely the same so that the market demand curve will be a large-scale replica of the demand of each individual. Davidson repeatedly warns of this analytical constraint, but then, curiously, fails to heed his own admonitions. He attempts to find the single most profitable three-step block schedule which is equally applicable to three different classes of consumers. He uses the technique which assumes that all purchasers are alike, but the result must be and is clearly wrong. Moreover, there is no presumption that his conclusions for this case are qualitatively correct. So far as I know this problem remains unsolved.

To answer the second question — how the various forms of discriminatory pricing affect the allocation of resources in the economy — the well-known criterion of marginal cost pricing is employed as a norm. Davidson must be praised for emphasizing that too much as well as too little may be produced in a particular industry and that the proper distribution of the product among users is just as important as the correct total output. The careful comparison of the consequences of various price and regulatory policies and the correction of a number of errors in the literature dealing with this matter will undoubtedly be of interest. Despite claims often made to the contrary, Davidson concludes that, relative to the standard of marginal cost pricing, current rate-making practice leads to widespread misallocation of resources. As a practical matter he advocates an approximation to "nondiscriminatory" marginal cost pricing by means of a time-of-day rate schedule for electric utilities and a seasonal rate schedule for gas utilities. A time-of-day rate schedule for gas is not felt to be essential because gas, unlike electricity, can be stored and therefore marginal costs are unlikely to vary significantly from hour-to-hour.

These recommendations must not go without comment. First, welfare economics demonstrates only that marginal cost pricing leads to an efficient allocation of resources *provided* that it is practiced in all other industries and that equivalent conditions are satisfied in the input markets. It has often been argued but never demonstrated that marginal cost pricing is optimal in an economic sense if these conditions do not hold in other industries and markets. And there are few who would argue that in the American economy marginal cost pricing is the rule. Second, what Davidson understands by marginal cost pricing will probably lead to misallocation of resources even under the most favorable conditions, for he feels that rates should be equal to long-run marginal costs. Because of this he explains a series of complex calculations which will ensure proper "allocation" of capacity costs. But in my estimation modern welfare economics is abundantly clear on the proposition that existing facilities will be optimally utilized only if price is equated to short-run marginal costs. Expansion decisions, in turn, must be made on the basis of a comparison of the present discounted value of future receipts with the present discounted value of the costs.

All in all the book will lead to much interesting discussion and every public utility economics specialist will wish to refer to it.

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